**AP BIOLOGY MIDTERM REVIEW GUIDE 2017-2018**

**Unit I: Intro/Scientific Practices**

Chapters 1,2

* Graphing
* Chi-Square Test
* Statistical Analysis
* Scientific Inquiry

**Unit 2: Evolution & Phylogeny**

Chapters 22-27

* Natural Selection serves as a mechanism for evolution
* Evidences for Evolution (biochemical, embryological, anatomical, fossil)
* Hardy-Weinberg concept and how to calculate
* Speciation – causes, mechanisms
* Origin of Life, Miller-Urey Experiment
* Events in the “history of life” (origin of single-celled and multicellular organisms, mass extinctions, adaptive radiations)
* How to create and read a cladogram/phylogenetic tree
* Evolution of antibiotic resistance

**Unit 3: Biochemistry**

Chapters 3-5

* Monomers/polymers
	1. Functions in living things
	2. Identify molecular representations of each
* Bonding patterns (ionic, covalent, hydrogen, peptide)
* Hydrolysis and Dehydration Synthesis reactions

**Unit 4: The Cell (Structure, Function, Homeostasis)**

Chapters: 6,7

* Prokaryote vs. Eukaryotes
* Organelles – structure, function, location in cells
	+ - Difference in function/product between cytoplasmic and rough ER ribosomes
		- Components of the endomembrane system
		- Explain the interconnectedness of cellular parts to cell function as a whole
* Endosymbiotic Theory
* Membrane Structure and Function (phospholipid bilayer, significance of polarity)
* Active, Passive and Bulk Transport (endo and exocytosis)
	+ - How does water move through the cell membrane
		- How do ions move through the membrane
* Calculate solute potential and water potential using provided formula sheet

**Unit 5: Cell Energy: Metabolism, Photosynthesis and Respiration**

Chapters: 8-10

* Differentiate endergonic vs exergonic reactions
* Describe the formation and use of ATP
* Explain the role of enzymes in cellular processes
* Describe enzymatic activity (how they work/are inhibited)
* Regulation of enzyme activity (ex. Allosteric regulation)
* Laws of Energy Transformation
* Identify organelles responsible for cellular respiration
* Identify stages of cellular respiration and their location (glycolysis, Krebs/Citric Acid Cycle, ETC & chemiosmosis)
* Role of ATP synthase and how it works
* Identify and analyze requirements (reactants) for each stage of cell respiration
* Identify and analyze products created by each stage of cell respiration
* Evaluate the significance of cellular respiration to living things
* Identify and explain alternative pathways to carry out cellular respiration (Ex. How does it occur if certain reactants are missing?)
* Aerobic verse Anaerobic respiration
* Describe the function and purpose of fermentation (alcoholic, lactic acid)
* Identify organelles responsible for photosynthesis
* Identify stages of photosynthesis and their location (light and dark reactions (Calvin Cycle)
* Identify and analyze requirements (reactants) for each stage of photosynthesis; which one is *most* important?
* Identify and analyze products created by each stage of photosynthesis
* Evaluate the significance of photosynthesis to living things

**Unit 6: Cell Communication, Cell Cycle, and Cell Division**

Chapters: 11-12

* Evolution of Cell Signaling
* Reception, Transduction, Response
* Cell Cycle (stages, events, checkpoints)
* Mitosis (stages, events, chromosome formation, chromosome number, purpose)
* Regulation of Eukaryotic cells by molecular control systems
	+ - Causes of cancer
		- Proto-oncogenes, tumor suppressor genes
* Origin of cell communication

**Unit 7: Genetic Basis of Life**

Chapters: 13-15

* Mendel’s Model (laws of probability, inheritance patterns)
* How to use Punnett Squares
* Chi Square
* Meiosis (stages, events, chromosome formation, chromosome number, purpose)
* Significance of crossing over, independent assortment, fertilization, non-disjunction to genetic variation
* Genetic variations and the sexual life cycle
* Gene-Chromosome theory
* How to interpret a karyotype
* Genetic Disorders

**Unit 8: Protein Synthesis & Gene Expression ~~and Biotechnology~~**

Chapters: 16-19

Overview of Lecture and Discussion Topics:

* DNA history, structure, function and replication
	+ How to calculate % of nucleotide bases using Chargaff’s Rule
	+ DNA vs RNA
* Flow of genetic information (genetic code, role of other polymers, transcription, translation)
* Mutations (types, effects)
* Gene Expression (prokaryotes vs eukaryotes) (promoter, enhancers, regulatory genes
* Lac operon
* Pitx1 homeotic gene
* Positive vs Negative feedback control
* Viruses (structure)