Advanced Placement Biology Syllabus 2016-2017

Content

Introduction

This is a senior level course. Students must have successfully completed biology and chemistry with a B average. Our school has 47 minute class periods which meet 5 days a week

Text: Urry, Cain, Wasserman, Minorsky, and Reece. "Campbell - Biology in Focus" 2nd edition, 2017, Pearson Publishing (**Curricular Requirement 1)**

Supplemental materials: POGIL for high school biology, POGIL for AP Biology, "Test Prep series for AP biology" by Pearson Publishing, and "Survival of the Sickest" by Dr. Sharon Moalem, free response practice packet from FLINN

Supplemental websites: Bozeman Science, HHMI, Mastering (through Pearson), pHet, Explore Biology, Learning Genetics Utah, and PBS Nova labs

Supplemental reading: Excerpts from "Survival of the Sickest," "The Immortal Life of Henriette Lacks," and "The Beak of the Finch" will be completed. In addition, articles from various scientific journals and magazines will be read and discussed. The topics of discussion with be genetic diseases, ethics of using human tissue, and scientific research. (**Curricular Requirement 5)**

Labs: At least 8 of the 13 labs from the "AP Biology Investigative Labs: An Inquiry Approach" by the College Board will be completed. With the other labs being discussed or data analyzed through online simulations. More than 30% of class time will be in the lab performing guided inquiry (Level 3 – student directed) investigations culminating formal lab reports, analysis videos, or poster presentations. (**Curricular Requirement 7 and 8)**

Levels of Inquiry: Level 1 – Teacher directed (confirmation)

Level 2- Structured inquiry

Level 3 – Guided inquiry

Level 4 – Open inquiry

Throughout this class, students will develop analytical skills, be introduced to new laboratory techniques, and refine written communication. Students will actively participate in discussion, plan and carry out investigations, and interpret data and scientific literature. The AP Biology Curriculum is framed around four big ideas. (**Curricular Requirement 2,6, and 8)**

Science Practices:

1. The student can use representations and models to communicate scientific phenomena and solve scientific problems.
2. The student can use mathematics appropriately.
3. The student can engage in scientific questioning to extend thinking or to guide investigations within the context of the AP course.
4. The student can plan and implement data collection strategies appropriate to a particular scientific question.
5. The student can perform data analysis and evaluation of evidence.
6. The student can work with scientific explanations and theories.
7. The student is able to connect and relate knowledge across various scales, concepts, and representations in and across domains.

The course is structured around the 4 big ideas. (Curricular Requirement 2)

Big Idea 1: The process of evolution drives the diversity and unity of life.

Enduring understanding 1.A: Change in the genetic makeup of a population over time is evolution.

Enduring understanding 1.B: Organisms are linked by lines of descent from common ancestry.

See also: 3.A.1, 3.D.1, 2.B.3, 4.A.2

Enduring understanding 1.C: Life continues to evolve within a changing environment.

See also: 4.C.3

Enduring understanding 1.D: The origin of living systems is explained by natural processes.

See also: 4.A.1, 2.B.1

Big Idea 2: Biological systems utilize free energy and molecular building blocks to grow, to reproduce, and to maintain dynamic homeostasis.

Enduring understanding 2.A: Growth, reproduction and maintenance of the organization of living systems require free energy and matter.

See also 4.A.2

Enduring understanding 2.B: Growth, reproduction and dynamic homeostasis require that cells create and maintain internal environments that are different from their external environments.

See also: 4.A.1, 4.A.2

Enduring understanding 2.C: Organisms use feedback mechanisms to regulate growth and reproduction, and to maintain dynamic homeostasis.

Enduring understanding 2.D: Growth and dynamic homeostasis of a biological system are influenced by changes in the system's environment.

See also: 1.B.1,4.A.5, 4.A.6

Enduring understanding 2.E: Many biological processes involved in growth, reproduction and dynamic homeostasis include temporal regulation and coordination.

See also: 2C2

Big Idea 3: Living systems store, retrieve, transmit, and respond to information essential to life processes.

Enduring understanding 3.A: Heritable information provides for continuity of life.

See also 3.C.2, 3.C.3, 4.A.1

Enduring understanding 3.B: Expression of genetic information involves cellular and molecular mechanisms.

Enduring understanding 3.C: The processing of genetic information is imperfect and is a source of genetic variation.

See also 1.A.2, 1.B.1, 1.B.3, 1.C.3, 3.A.1, 3.A.2, 3.A.3, 4.C.2, 4.C.3

Enduring understanding 3.D: Cells communicate by generating, transmitting and receiving chemical signals.

See also: 1.B.1, 2.D.4

Enduring understanding 3.E: Transmission of information results in changes within and between biological systems.

See also: 1.A.2

Big Idea 4: Biological systems interact, and these systems and their interactions possess complex properties.

Enduring understanding 4.A: Interactions within biological systems lead to complex properties.

See also: 1.D.1, 2.A.1, 2.A.2, 2.A.3, 2.B.1, 2.B.3, 2.D.1, 2.D.3, 3.A.1, 3.B.1, 3.B.2, 3.E.1, 3.E.3

Enduring understanding 4.B: Competition and cooperation are important aspects of biological systems.

See also: 1.A.1, 1.A.2, 2.A.2, 3.D.3, 4.A.2

Enduring understanding 4.C: Naturally occurring diversity among and between components within biological systems affects interactions with the environment.

See also: 1.A.1, 1.A.2, 1.C.1, 2.B.1, 3.A.1, 3.A.4, 3.B.2, 3.C.1, 4.A.1, 4.A

Big Ideas and enduring understanding will be posted in the room. As connections are made, a string will join the related concepts. This will build a web of relatedness as the course progresses. **(Curricular requirement 3a, 3b, 3c, 3d, 4a, 4b, 4c, and 4d)

Lab	SP 1	SP 2	SP 3	SP 4	SP 5	SP 6	SP 7	BIG IDEA 1	BIG IDEA 2	BIG IDEA 3	BIG IDEA 4	Report or Present
Intro to Inquiry (Don't be a square and checks)	X		X	X	X		X					R
Termite Behavior - Investigation 12			X	X	X	X	X				X	P
Dave the BLAST lab - Investigation 3	X				X			X				R
Brine Shrimp Hatch out Rate - Investigation 1			X	X	X	X	X		X		X	R
Catalase with yeast spheres - Investigation 13		X	X	X	X	X	X		X		X	R
- Toothpickase	X	X	X	X	X	X	X		X			R
Respiration of yeast in molasses - Investigation 6		X	X	X	X	X	X		X		X	R
Population Genetics & Evolution –Stickleback fish	X	X			X	X	X	X				P
Sex & Single Guppy	X	X	X	X	X	X	X	X				R
Fishy Frequencies and beads (Hardy Weinberg) - Investigation 2	X	X			X	X	X	X				R
Transpiration - Investigation 11	X	X		X		X	X		X		X	P
Diffusion & Osmosis - Investigation 4	X	X		X	X	X			X		X	P
Genes and Consequences (Human genetics) - Investigation 3	X	X	X	X	X	X	X	X		X		P
Photosynthesis - Investigation 5		X	X	X	X	X		X	X			R
pGlo Transformation - Investigation 8	X			X	X	X				X		R
Mitosis & Meiosis (*Sordaria*) - Investigation 7		X	X	X	X	X	X	X		X		R
Genetics of Organisms (Fruit Flies) online simulation		X	X	X	X	X	X	X		X		P
Chi square Dry Lab	X	X	X	X	X	X	X			X		R
Chi Square and M&Ms	X	X	X	X	X	X	X			X		R
Restriction Enzyme Analysis - Investigation 9		X	X	X	X	X	X			X		R
Water Properties Lab		X		X	X						X	R

Students will assemble formal lab reports or presentations. They will maintain records as well. Completion of the labs will consume over 25% of the class. **(Curricular requirement 6, 7, and 8)**

Course Topics by Chapter Aligned to Big ideas:

Big Idea 1: Evolution	**Big Idea 2: Free Energy**
Natural Selection (Chapters 18-25) - Natural selection with examples - Genetic drift - Evidence of evolution - Essential characteristics are conserved - Speciation (Chapters 19-25) - Phylogenetic - Speciation and extinction - Mechanisms for speciation - Populations continue to evolve - Abiogenesis - The origin of life	Cell Processes (Chapters 5-8) - Life requires free energy - Free energy capture and storage - Environmental matter exchange - Cell membranes - Transport across membranes Homeostasis (Chapters 29-32) - Positive and negative feedback loops - Response to external environments - Biotic and abiotic factors - Homeostatic evolution - Homeostatic disruptions - Plant and animal defense - Development: Timing and coordination - Mechanisms of timing and control - Behavior and natural selection - The immune system (Ch. 35)
Big Idea 3: Energy	**Big Idea 4: Systems and interactions**
Genetics (Chapter 9-16, 18) - DNA and RNA - Cell cycle, mitosis, and meiosis - Mendelian genetics - Advanced genetics - Gene regulation Cell communication (Ch. 5, 18, 37-38) - Signal transmission and gene expression - Genotypes and phenotypes - Mechanisms that increase genetic variation - Viral replication (Chapter 17) - Evolutionary significance of cell communication - Cell communication - Signal transduction pathway - Effects of change in the pathway - Information exchange - Animal nervous system	Systems - Biological Molecules (Chapter 1-3) - Cellular organelles (Chapter 4 and 5) - Cellular specialization (Chapter 4 and 5) - Organ systems - Communities - Ecosystems - Enzymes (Chapter 3 and 6) Interactions (Chapters 40 – 43) - Cooperative interactions - Populations - Ecosystem exchange - Cellular variation - Genotype expression - Population dynamics - Biodiversity

Omit chapters 26-28, 30, 33-34, 39 **Course Requirement 2**

The Foundation

Unit 1. Nature of Science; Chemistry of Life (1st Quarter)

Reading: (**Chapters 1 – 3)** Ch 2: Chemical Context of Life, Ch 3: Carbon Molecules,
Enduring understandings to be addressed: 2A and B; 4A **CR3b and CR3d**
Discussion Topics and Skills: Introduction to the 4 Big Ideas and Enduring Understandings; biochemistry, water, and macromolecules

Process of science reviewed:

- Scientific method, with emphasis on the fact that there is no ONE way to do science.
- Explain what is meant by scientific theory
- Practice thinking like a scientist
- Practice with data collection, analysis, and presentation

Chemistry of Life:

- Identify basic elements of living organisms.
- Distinguish between inorganic and organic compounds.
- List and describe water's unique properties; relate properties to structure; describe importance of these properties to living organisms.
- Describe characteristics, structure, and function of organic compounds. (carbohydrates, proteins lipids, nucleic acids) – including the monomers and bond types
- Contrast condensation reactions (dehydration synthesis) and hydrolysis.

Activities:

1. Milk Lab - Nature of Science: Analyze data, create and revise hypotheses, draw conclusions; understand that conclusions are often tentative and may be changed with the discovery of new data. Discuss polarity.
2. Molasses Lab - Nature of Science: design an experiment: Emphasis on development of testable hypothesis, identification of independent, dependent and controlled variables, procedure development, and data analysis using mathematics and graphing. (AP investigation 6)
3. Toothpickase - Enzyme Catalysis Model: Objective: create models to illustrate an enzyme/substrate complex, the interaction of a competitive inhibitor, and changing the concentration of enzyme or substrate
4. Catalase lab - Enzyme Optimization: Students will analyze background information, develop a hypothesis, and design and carry out an experiment to determine optimum pH, concentration, temperature, or inhibitor for catalase in yeast. (Investigation 13)
5. Macromolecule POGIL
6. Reading the book with a guided outline
7. Water's properties lab

Free response questions:

- 2010 – 2
- 2005 – 1
- 2002 – 2
- 2003B – 3
- 2000 – 1

Unit 2. Intro to Homeostasis & Response to the Environment (1st quarter)

Reading: (Chapters 4, 5, 6, 7, 25.1) Ch 4: Tour of the cell Ch 5: Membrane transport and cell signaling Ch 6: An introduction to Metabolism, Ch 7: Cellular Respiration & Fermentation Ch 25.1 Endosymbiosis
Enduring understandings: 1B-D; 2A-D; 3A-B, 3D-E **CR3A AND CR3C**
Discussion topics: Cell organelles, cell junctions, cytoskeleton, cell membrane, transport across the membrane, and cell signaling

Cell structure and Function

- Review basic cellular components focusing on structure and function and their evolution
- Calculate surface-to-volume ratios in comparing cells of different sizes
- Construct models comparing key differences between prokaryotic vs. Eukaryotic cell structure
- Discuss endosymbiosis

A closer look at cell membranes

- Explain the concept of selective permeability as it applies to cell membrane function
- Distinguish between passive and active transport
- Compare cell communication processes in different types of organisms
- Reception, transduction, and response

Plant and Animals – Common Challenges

- Define homeostasis in relation to the internal environment of an organism
- Compare negative and positive feedback processes in a plant and animal
- Illustrate, with examples, how a cell uses diffusion and active transport to maintain homeostasis
- Explain the process of apoptosis as a normal process

Enzymes:

- Investigate enzyme structure and function, and the relationship between enzymes and energy use, through analysis of data and graphs
- Model the role of the participants (substrates, intermediates, enzymes, cofactors, energy carriers and products) in a variety of metabolic pathways.

Activities:

1. Diffusion and Osmosis Lab (AP Investigation 4)
2. Calculating water potential
3. POGIL on membranes, transport, and signal transduction **CR4 A-D**
4. Reading guide on Chapters 4-7
5. Build a membrane from Learn genetics Utah **CR4 B**
6. Modeling signal transduction with paper and video **CR4 A-D**
7. Reading the book with a guided outline

Free Response questions from previous AP Exams:

2011-1	2008B-2	2008-3	2006B-2
2005B-4	2004B-3	2002-4	

Unit 3. Metabolism, Photosynthesis, and Respiration (1st quarter)

Reading: (Chapters 6, 7, and 8) Ch 6: An introduction to Metabolism, Ch 7: Cellular Respiration & Fermentation Ch 8: Photosynthesis Ch 29: Resource acquisition, nutrition, and transport in plants

Enduring understandings: 1A, 1D, 2A and B, 4A, 4B **CR3A, CR3B, AND CR3D**

Discussion topics: Free energy, ATP, respiration, and photosynthesis

- How ATP powers the cell
- Harvesting chemical energy: glycolysis, citric acid cycle, phosphorylation
- Light and dark reactions in photosynthesis

Activities:

1. The evolution of the cell http://learn.genetics.utah.edu/content/cells/organelles/
2. POGIL activities **CR4 A-D**
3. Reflect on yeast/molasses lab
4. Photosynthesis lab with spinach leaf disks (AP Investigation 5)
5. Transpiration lab (whole plant method) with stomata counts (AP investigation 11)
6. Reading the book with a guided outline

Free Response questions from previous AP Exams:

2011-2	2011 – 4	2010B-2	2010B – 1	2009B – 4
2010 – 1	2006 – 3	2009 – 2	2006B – 3	2003B – 2
2011-4	2010B-1	2006-3	2006B-3	2003B-2

Photosynthesis/Cell Respiration, 1993

Unit 4. Cell Cycle, Mitosis, Meiosis (2nd Quarter)

Reading: (Chapters 9, 10, 16) Ch 9: The cell cycle, Ch 10: Meiosis and sexual life cycles, Ch 16: Development, stem cells, and cancer

Enduring Understandings: 2E, 3A, 3B, 3D **CR3B AND CR3C**

Discussion topics: mitosis, meiosis, chromosomes, genetic variations, stem cells, cancer

- Cell cycle and mechanism of control
- Chromosomes and crossing over
- Evolutionary advantages of sexual and asexual reproduction
- Compare plant and animal cell division
- Discuss how cancer forms, how embryonic cell develop, and uses for stem cells
- Compare mitosis to meiosis
- "The Immortal Life of Henrietta Lacks"

Activities:

1. Using mitosis cards, student will calculate the time cells are in each stage (AP Investigation 7)
2. Students will perform a CHI square analysis on the mitosis cells
3. CHI square MandM activity
4. Sordaria meiosis analysis (AP investigation 7) *Sordaria* crossing over images. Shows crossing over.www.jdenuno.com/PDFfiles/Sordaria.pdf
5. Karyotype activity **CR4 A-D**
6. Reading the book with a guided outline

Free Response Questions:

2011 – 3	2008 – 4	2002B – 4	2005 - 3
2011B – 1	2004 – 1	2006B - 1	Plant reproduction, 1987

Unit 5. Genetics (2nd Quarter)

Reading: (Chapters 11-13, 30, 36) Ch 11: Mendel and the gene idea, Ch 12: Chromosomal basis for inheritance, Ch 13: Molecular basis for inheritance, Ch 30: Reproduction in flowering plants, Ch 36: Reproduction and development

Enduring Understanding to be addressed: 1A,C; 2A,E; 3A,C; 4A,C **CR3 A-D**

Discussion Topics and Skills:

- Review experimental data about cell differentiation
- Reproductive Mechanisms
- Discuss mechanisms that increase genetic variation; relationship to evolutionary fitness
- Revisit alternation of generations in the context of evolutions of organisms; sexual vs. asexual; viral replication
- Describe the double fertilization that occurs uniquely in the flowering plant life cycle
- Differentiate between growth and development; discuss regulation mechanisms
- Observing Patterns in Inherited Traits
- Discuss the significance of the work of Mendel
- Collect and analyze data related to several different inheritance patterns
- Construct and interpret Punnett squares; apply product rule
- Construct and interpret pedigrees
- List several examples of human inheritance patterns focusing on diseases which can be screened; are there ethical implications? **CR4 C**
- "Survival of the Sickest" **CR4 A-D**

Assignments:

1. Punnett squares along with CHI square analysis of real data
2. Genes and consequences with BLAST (Investigation 3)
3. Blood group Genetics
4. Students act as blood geneticists at a medical lab and serve as expert witnesses in a case of disputed inheritance. Several inheritance patterns will be explored. **CR4 A-D**
5. Discussion: What are some benefits of genetic screening and genetic counseling? **CR5**
6. Would you want to know if your child had a genetic disease? **CR5**
7. Fruit fly genetics simulation with CHI square analysis of traits. http://sciencecourseware.org/vcise/
8. This link from the NCBI website gives some of the most common genetic diseases in humans as summaries and descriptions. Diseases are searched by their chromosome locations. **CR5** http://www.ncbi.nlm.nih.gov/disease/
9. Reading the book with a guided outline

Free Response Questions from previous AP Exams:

2011-3	2011B-1	2008-4	2004-1	2002B-4
2005-3	2006B-1	Plant Reproduction 1987		

Unit 6: All About Proteins (3rd Quarter)

Readings: (Chapters 14-15, 17-18) Ch 14: From Gene to Protein, Ch 15: Regulation of gene expression, Ch 17: Viruses, Ch 18: Genomes and their evolution

Enduring Understandings: 2C, 3B, 3C, 4A **CR 3 B-D**

Discussion topics and Skills:

- DNA Structure and Function
- Discuss the historical events leading to our current knowledge of DNA
- Draw a DNA molecule, labeling the parts of a nucleotide
- Create an illustration how double-stranded DNA replicates for stockpiles of nucleotides
- From DNA to Protein
- Compare/contrast DNA and RNA (also in Chapter 3)
- Describe the stages of protein synthesis; translate a DNA code into a polypeptide chain
- Cite an example of a change is one DNA base pair that has a profound effect on the human phenotype (sickle cell anemia) ; revisit heterozygote advantage of this trait and malaria
- Investigate some of the environmental agents that can cause mutations and the type of mutations these agents cause
- Explain why mutations in germ cells are usually more of a problem than mutations in somatic cells
- List and define the levels of gene control in eukaryotes; contrast this with prokaryotic gene control (operon systems)
- Viruses structure and activity
- Restriction enzymes, plasmids and transformation
- Applications of gel electrophoresis

Activities:

1. Discussion: Why is the genetic code almost universal? What are the evolutionary implications of this?
2. Discussion: How does knowing the genetic makeup of Earth's organisms help us reconstruct the evolutionary history of life?
3. Discussion: What problems might be involved in trying to clone extinct animals? (explore societal and environmental concerns) **CR5**
4. Compare 3-D graphic models of DNA in replication, transcription, and translation **CR4 D**
5. Biotechnology: Bacterial Transformation (AP Investigation 8) **CR5**
6. Biotechnology: Restriction enzyme analysis of DNA (AP Investigation 9) **CR5**
7. Protein Synthesis Activity: Objective: provide students with game format to "see" the relationship between DNA, RNA, and proteins. **CR4 A-D**
8. Create a model of an operon **CR4 A-D**
9. DNA and histone model from Learn genetics Utah. **CR4 A-D**
10. Reading the book with a guided outline

Free Response Questions from Pasts tests:

2009B – 1	2005 – 2	2002 - 1
2009 – 4	2005B – 3	2001 - 4

Unit 7: Evolutionary Biology & Biodiversity (3rd Quarter)

Reading: (Chapters 19-22) Ch 19: Descent with Modification, Ch 20: Phylogeny, Ch 21: Evolution of Populations, Ch 22: Origin of Species

Enduring understandings: 1A-1D; 2A-B, 2D-E; 3A, C; 4A, B, C **CR3 A-D**

Discussion topics and skills:

Ch 19: Descent with Modification

- Descent with modification explains the adaptations of organisms and the unity and diversity of life.
- Lamarck vs. Darwin; students will illustrate the difference using several examples
- Describe and justify the evidence Darwin used to develop the theory of natural selection

Ch 20: Phylogeny

- Discuss and compare the kingdoms in relation to evolution of structures, metabolism, and cellular organization; classification (systematics, phylogeny, cladograms); role in the biosphere (niche); life cycles
- Shared characters are used to construct phylogenetic trees

Ch 21: Evolution of Populations

- Distinguish between microevolution and macroevolution
- Relate differences that occur in gene pools, alleles, and allele frequency to each other
- Calculate allele frequencies in populations in Hardy-Weinberg equilibrium selection
- Distinguish the founder effect from a bottleneck
- Define mechanism of natural selections and briefly describe what is occurring when a population is said to evolve.
- Distinguish between an adaptation and an evolutionary adaptation
- Compare/Contrast natural and artificial selections; students will identify what these process have in common.

Ch 22: Origin of Species: Evolutionary Patterns, Rates, and Trends

- Explain the relationship between gene flow and genetic divergence
- Evaluate phylogenetic trees to see how taxonomy reflects evolutionary history

Activities:

1. The Beak of the Finch Statistical Analysis. **CR4 A-D**
2. Brine Shrimp Lab: Artificial Selection and Intro to Cladograms (AP Investigation 1)
3. BLAST with Dave the fossil (AP investigation 3)
4. Cladograms: Students will understand the nature of cladograms based on the various types of data; learn how to read and analyze cladograms; construct cladograms and Venn diagrams from provided data. **CR4 A-D**
5. Hardy Weinberg Project with Fishy frequencies or bead lab introduction **CR4 A-D**
6. Rock Pocket Mouse on HHMI **CR4 A-D**
7. Stickleback and Lizard lab on HHMI **CR4 A-D**
8. NOVA; PBS video "What Darwin Never Knew" **CR4 A-D CR5**
9. HHMI video "Evolution" **CR4 A-D CR5**
10. Reading the book with a guided outline
11. Students research antibiotic resistance **CR4 A CR5**

Free Response Questions:

2011B – 4 2009 – 3 2008B – 4 2008B – 3 2008B – 2 2004 - 2

Unit 8. Ecology and Behavior (4th Quarter)

Reading: (Chapters 40-43) Ch 40: Population ecology and distribution of organisms, Ch 41: Species Interactions, Ch 42: Ecosystems and energy, Ch 43: Global ecology and conservation biology
Enduring Understandings: 1A and C, 2A,C-E, 3E, 4A, B, and C **CR3 A-D**

Discussion Topics and Skills:

- Population Ecology
    - Analyze and interpret logistic and exponential growth curves
    - Convert data tables into different survivorship curves and age structure diagrams
- Community Structure and Biodiversity
    - Contrast types of symbiosis
    - Relate community interactions to coevolution
    - Compare succession within different communities
- Ecosystems
    - Compare biogeochemical cycles in terms of the role of different organisms
    - Analyze trophic levels and calculate flow of energy through food chain/web/pyramid
- Behavioral Ecology
    - Compare animal behavior in different environments and to different stimuli
    - Compare/contrast the role of the environment and genes on behavior with both animal and plant examples
    - Explain how adaptive behavior, social behavior, selfish, behavior, and altruism can all promote an individual's reproductive success (fitness); what are the costs/benefits of each other?

Assignments:

1. Ecology: Graphically depict the survivorship curves of three different species and explain the differences between them. **CR4 A-D**
2. Competition or Cooperation: determine whether competition or cooperation among team members is more efficient when it comes to completing a task.
3. Sex and the single guppy from the Biology Corner **CR4 A-D**
4. Termite Behavior Lab (AP Investigation 12)
5. Read "Invasive plant suppresses the growth of native tree seedlings by disrupting belowground mutualisms" by Kristina Stinson **CR4 A-D CR5**
6. "How do abiotic factors affect distribution of organisms" from Campbell Biology **CR4 A-D**
7. Reading the book with a guided outline

Free response questions from previous AP Exams:

2011B-2 2011B-3 2010 – 4 2008 2007-3

Unit 9. The Immune System (4th Quarter)

Reading: (Chapter 35) Ch 35: Immune System
Enduring Understandings: 1B-3; 2A **CR3 A-B**

Discussion Topics and Skills:

- Neural Control
- Sensory Perception
- Endocrine Control
- Immunity

Activities:

1. Antibody Diversity (connect to genetics) **CR4 A-D**
2. Reading the book with a guided outline

Free Response questions from previous AP Exams:
2011-2 2010B-2 2010 – 1 2009-2 2009B-4

Unit 10. AP Biology Test Prep (4th Quarter)

Discussion Topics:

- Review all topics, show the interrelatedness of the four big ideas **CR3 A-D**
- Take full practice exams - Full-length, released tests used throughout course for diagnostic purposes.
- Review format determined by needs of students

Activities:

1. Practice tests
2. Practice with linking enduring understandings