Advanced Placement Biology

Castle View High School 2016-17

Mr. Erlenbeck

Course description:

I am passionate about all things science and I have always been excited to be able to teach AP Biology. I am a nerd in love with the natural world around me. When you're in love, all you truly want to do is tell others about it. Part of the appeal of teaching this class is the opportunity for me to disseminate important and exciting content to highly motivated students, but an equally integral part of the class is the ability to build in students the valuable skills of critical thinking, reasoning, and college-level responsibility. Science is not simply an accumulation of facts to be memorized, but rather a process by which humans formalize their innate curiosity and wonder of the natural world in order to learn the truths its willing to tell us if we ask the right questions. These goals are achieved while maintaining a rigorous, inquiry-rich learning environment and making advanced biology concepts relevant and accessible to learners on an individual basis. Ultimately, students will leave my course with the necessary knowledge and skills to make educated decisions about biological, environmental and social issues that will inevitably arise in their lives.

"Science is a way of thinking much more than it is a body of knowledge." – *Carl Sagan*

Course overview:

AP Biology meets for 85 minutes a day for 129 days total, however there are approximately 116 days suitable for instruction with the timing of the AP exam 11 days prior to the end of the school year. Given that we are allotted more class time than would be available with a traditional schedule, there is more than adequate time for hands-on laboratory work. Through the use of the recommended AP labs, and supplemental labs I've selected, we easily exceed the minimum 25% of instructional time spent in the lab.

Students are required to read the textbook chapters listed on the syllabus, along with any supplemental readings I provide. There will be unit tests approximately every four chapters in addition to previous AP Biology essay questions, student research projects, and assessments based on the in-class labs. The course textbook is the tenth edition of Neil A. Campbell and Jane B. Reece's *Biology* (AP Edition), copyright 2013 by Pearson Education, Inc.

AP Biology is a course that relies on major underlying themes, or "big ideas". Part of my goal is for students to realize that all content can be tied together to these main themes and that there are no isolated facts when it comes to biology as a subject matter. As students begin to grow as critical thinkers, they will begin to realize these connections themselves.

AP Biology is a college-level course and students should expect a workload equal to what would be encountered in college. The typical college formula is that students will spend about 3 hours of their own time per hour spent in class. In this class, typically, the formula is that students spend an equal amount of their own time outside of class per hour spent in class. As we spend 85 minutes in class every day, you should expect to have at least an equal amount of work to do per day. **This may be very difficult for you if you are in multiple AP classes. I am sorry, but my expectations will not be adjusted due to your schedule.**

I would also like to make a quick note about student's holding part-time jobs outside of school hours. It has been my experience in teaching this course that students who hold jobs have an extremely difficult time doing well in class. In my many discussions with these students it usually comes down to lack of sleep or poor time management skills. I would advise all students taking an AP course to seriously consider weighing the benefits and drawbacks of part time work. This should be a serious discussion you have with your parents/guardians so you can make an informed decision.

The course will focus on four general big ideas of biology:

I. The process of evolution that drives the diversity and unity of life.
II. The utilization of free energy and molecular building blocks to grow, reproduce, and maintain dynamic homeostasis.
III. The storage, retrieval, transmission, and response of information essential to life processes in living systems.
IV. Biological systems interactions and their underlying complexities.

Within these four areas, the following will be emphasized and connected across all topics:

I. Science as a Process
II. Evolution
III. Energy Transfer and Matter Cycling
IV. Expression and Transmission of Information
V. Relationship of Structure to Function
VI. Homeostatic mechanisms
VII. Organization and Emergent properties
VIII. Science, Technology, and Society

Course Content Planner:

Unit	Approximate # of Days	Approximate Dates	Discussion topics	Labs and In-class activities	Reading Topics and Text Location
Start of 2nd term					
0 - Introduction	3	Oct. 17 – 19	• Nature of science • Observation vs. Inference • Experimental Design • Theories	**1.** AP Bio Scavenger Hunt **2. AP Lab 12:** Animal Behavior **3.** Chi-Square Analysis	**1.** Introduction: Themes in the Study of Life (1.1-1.3)
Domain 1: The Modern Synthesis					
1 – Evolution	12	Oct. 20– Nov. 4	• History of development of theory of evolution • Evidence for evolution • Evolutionary Forces • Measuring Evolution	**1. AP Lab 1:** Artificial Selection **2.** The Taste Game **3.** Natural Selection of Peppered Moths **4.** Evolutionary Force Modeling **5. AP Lab 2:** Mathematical Modeling: Hardy-Weinberg **6.** Phylogenetics	**1**. Descent with Modification (22.1-22.3) **2.** Forces that Drive Evolution (23.3, 23.4) **3.** Genetic Variation and Hardy-Weinberg Equilibrium (23.1, 23.2) **4.** Speciation (24.1-24.4) **5.** History of Life on Earth (25.1-25.6) **6.** Phylogeny (26.1-26.3)

2 – Molecular Genetics	16	Nov. 7 – Dec. 2	• History of DNA • DNA structure and function • DNA replication • Protein synthesis, transcription, and translation • Biotechnology • New and emerging technologies	**1. AP Lab 1:** Artificial Selection (cont.) **2. AP Lab 8:** Bacterial Transformation **2.** Protein synthesis simulation **3.** Human genome scavenger hunt **4.** Restriction enzyme digest simulation **5.** Bioinformatics **6. AP Lab 3**: Comparing DNA Sequences to Understand Evolutionary Relationships with BLAST	**1.** RNA and DNA structure and function (16.1-16.2) **2.** Watson & Crick 1953 Nature article **3.** The Central Dogma (17.1-17.4) **4.** Mutations (17.5) **5.** Viral structure and replication (19.1-19.3) **6.** Nucleic acid technology and applications (20.1-20.4, 21.1-21.3) **7.** Nature: What is a gene?
Thanksgiving Break (Nov. 23 – 25)					
3 – Heredity	7	Dec. 5 – Dec. 13	• The work of Mendel • Patterns of inheritance • Mitosis and meiosis • Linkage and association	**1. AP Lab 1:** Artificial Selection (cont.) **2.** Puzzling pedigrees **3.** Virtual fly lab	**1.** Meiosis and gametogenesis (13.1-13.4) **2.** Eukaryotic chromosomes (15.1-15.3, 16.3) **3.** Inheritance patterns (14.1-14.4, 15.2-15.5)
Winter Break (Dec. 19 – Jan. 2)					
Domain 2: Matter					
4 – Biochemistry	4	Jan. 3 – Jan. 6	• Basics of inorganic chemistry • Role and importance of water • Major biochemical molecules • Relationship of structure to function • Proteins and enzymes	**1. Mendelian Genetics** **2.** Observing hydrogen bonding in the universal solvent – water 3. AP Breakfast: Kitchen Chemistry **3.** Jolecules **4.** Lactaid and milk	**1.** Chemical Review (2.1-2.4) **2.** Water (3.1-3.3) **3.** Organic molecules in organisms (4.1-4.3, 5.1-5.5) **4.** Enzymes (8.4-8.5)
5 – Cells	13	Jan. 9 – Jan. 27	• Prokaryotic vs. eukaryotic cells • Plant vs. animal	**1. AP Lab 4:** Diffusion and Osmosis	**1.** Prokaryotic and eukaryotic cells (6.1-6.7, 27.1-27.6)

			cells • Organelle structure and function • Membrane structure and function • Viral and bacterial basics	**2.** Cell Diffusion races **3.** Intro to microscopy **4.** Cell staining **5. AP Lab 7**: Cell Division: Mitosis and Meiosis	**2.** Membranes (6.2, 6.4, 7.1-7.5, 11.1-11.4) **3.** Subcellular organization (6.2-6.7) **4.** Cell cycle and its regulation (12.1-12.3)
Domain 3: Energy					
6 – Enzymes & Metabolism	10	Jan. 30 – Feb. 10	• ATP • Enzyme structure and function • Oxidation and reduction reactions • Cellular respiration • Fermentation reactions	**1. AP Lab 13:** Enzyme Catalysis **2. AP Lab 6:** Cell Respiration **3.** Fermentation of sucrose **4.** Lactic acid fermentation	**1.** Free energy changes (8.1-8.3) **2.** Coupled reactions (9.1) **3.** Fermentation and cellular respiration (9.2-9.6)
7 – Plants & Photosynthesis	8	Feb. 13 – Feb. 24	• Leaf anatomy • Chloroplast structure and function • Light-dependent and independent reactions	**1. AP Lab 5:** Photosynthesis	1. Photosynthesis (10.1-10.4)
Domain 4: Interactions					
8 – Ecology	12	Feb. 27 – Mar. 14	• Biomes • Communities • Ecosystems • Populations • Conservation • Global environmental issues	**1. AP Lab 10:** Energy Dynamics **2.** Differential survival rates with owls/mice and Aquatic Primary Productivity **3.** Probability Modeling 4. Greenhouse Gases and Climate Change	**1.** Population dynamics (53.1-53.6) **2.** Communities and ecosystems (52.3-52.4, 54.1-54.5, 55.1-55.5) **3.** Global issues (52.1-52.2, 53.6, 55.5, 56.1-56.5)
Spring Break (Mar. 20 – 24)					

Domain 5: Systems					
9 – Regulation	10	Mar. 27 – Apr 7	• Feedback Loops • Eukaryotic vs. prokaryotic chromosomes and gene regulation • Development and cell differentiation • Transpiration • Tropisms • The Immune System	**1. AP Lab 11**: Transpiration **2.** Examination of plant anatomy using microscopes **3.** Tropism: Plant Growth in Response to a Stimulus **4.**Thermoregulation: That's Cold Blooded	**1.** Basic Animals Form and Function (40.1-40.4) **2.** Regulation of Gene Expression (18.1-18.5) **3.** Animal Development (47.1-47.3) **4.** Transport and Gas Exchange (36.1-36.6) **5.** Plant Responses (39.1-39.5) **6.** Immunity (43.1-43.4)
10 - Communication	9	Apr. 10 – Apr. 20	• Cell Communication • Hormonal Control • Animal Behavior • The Nervous System • Sensation, Integration, Response	**1**. **AP Lab 12**: Animal Behavior (*See Introduction*) **2.** Anatomy of the Human Brain 3. Human Reaction Time	**1.** Cell Signaling and Apoptosis (11.1-11.5) **2.** Hormones and the Endocrine System (45.1-45.3) **3.** Animal Behavior (51.1-51.4) **4.** Neurons and The Nervous System (48.1-48.4, 49.1, 49.2)
Review	10	Apr 24 – May 5		**1.** Practice AP exams	
***AP Biology Exam – May 8th @ 8 am**					
After the Exam	11	May 9 – May 23		Field Experience	

***About the AP Biology Exam:**
I do not believe that AP Biology should be focused solely on a student's ability to take the AP Biology Exam. I believe that students should focus on the beauty of the subject of biology and how to develop their skills as a scientist and problem solver. If this is done, students will perform well on the exam.

The AP Biology exam will assess your ability to think like a scientist, along with your understanding of the course content. This will also be true of any in-class assessments, and many of the in-class investigations. To that end, there will be situations and content on exams that ***will not*** be specifically discussed in class prior to their appearance on exams. This is very different than many other types of courses you might have taken. **Since the 2013 redesign in the curriculum, the AP Biology Exam has had the lowest percentage of students scoring a 5 on any AP-level science exam nationally.**

A good rule of thumb is that any content covered in the material you are responsible for reading/viewing/watching in the content work could appear on an exam, regardless of whether or not we have discussed it specifically in class. **The take-home message for you is that independent reading/viewing/watching is absolutely crucial, and must be done if you want to do well.**

Team Work and Extra Help

This course is a team effort. Although I expect you all to complete and hand in your own work, I highly encourage collaboration between students. This includes study groups and working together on assignments. Explaining this complex subject to someone else is a high form of learning. Working and studying together is a perfect recipe for this.

If you need extra help I am always available during travel advisement and after school most days. If you plan on getting help after school, please confirm that you plan to attend at least one day before you plan on coming in. If you don't let me know, I can't promise that I will be there. It is up to you to come prepared with specific questions about material, assignments, or labs. "I just don't get it" doesn't tell me anything except that you're being lazy. Use your book, online resources, and classmates to help you understand a concept. If you still can't wrap your head around it, then by all means please come and see me, but I cannot do the work for you.

Grade Weighting and Policy:

Students are evaluated based on their performance on unit tests that incorporate multiple choice, short answer and free-response questions as well as through lab write-ups, additional homework assignments, and projects that may be assigned throughout the course. The approximate grade breakdown is as follows, though much flexibility is used given extenuating circumstances that may arise:

Unit Tests:	55%
Past AP Exams (Midterms):	10%
Lab Work (including Formal Lab Write-ups):	30%
Homework, Projects, Discussions, etc.:	5%

Given that this grading scale is skewed towards tests and exams (65% vs. 35%), it requires a high amount of understanding on the part of the student. However, given that the course ultimately works towards the AP Exam in May, it is in the best interests of both the students and myself that if they show a lack of understanding on a particular unit that we go back and work towards a greater understanding of the material. With this in mind, reassessments will be offered for unit tests and homework assignments in order for students to achieve the optimal level of understanding required by myself and the AP Exam.

In order for a reassessment to be granted, the student must demonstrate that an effort was put in to ready themselves for the opportunity prior to the date of reassessment. Additionally, all assignments and labs for the unit must be completed in a satisfactory manner prior to the opportunity for reassessment. Only one reassessment opportunity may be granted per day, and an objective to reassess must be targeted by the student prior to any opportunity. It is in the best interests of every party involved that, by the end of the course, all students show a high level of understanding in all units of the course, as well as lab work. It is my hope that this policy facilitates this.

Characteristics of Highly Successful AP Biology Students:

Students who have performed well in class and on the AP Biology exam have consistently exhibited certain characteristics. In my experience, the qualities displayed by exemplary AP Biology students are as follows (but not limited to):

- They are curious and ask a lot of questions. These questions are generally deep, interesting, and difficult to answer.
- They are rarely absent, always punctual, focused, and mentally present.

- View themselves as active participants in class rather than passive consumers.
- Turn work in on or before assigned due dates.
- Accept and act upon criticism, feedback, and suggestions for improvement.
- Recognize they are taking a college level course and do not complain about the amount of work, nature of the work, or pace of the course.
- Take personal pride in the quality of their work and refuse to hand in anything but their best for assessment.
- Recognize that at this point in their educational career the job of their teacher is to provide them with opportunities to learn, not to make things easy or do the work for them.
- Understand that in the larger world, it will be crucial to their success to work together with their fellow human beings at least as often (if not much more often) than it will be to work alone.
- Have fun and enjoy a challenge.

I guarantee that embracing these mindsets and occasionally reflecting upon them will earn you a grade that both you and I are proud of. If you choose to ignore these guidelines, then I can promise you that both you and I will be unsatisfied with your final marks and action will be taken in order to encourage your growth. I care about my students becoming good people much more than I care about their grades. These are not suggestions for how to conduct yourself in this class, they are my non-negotiables for success.

Class Materials:

The following is a comprehensive list of the materials you need at minimum for the course. There may at times be other materials I ask you to bring in or share with the class. This list should be viewed as the start pack to get you up and running:

- Neil A. Campbell and Jane B. Reece's *Biology* (AP Edition), copyright 2013 by Pearson Education, Inc.
- 2 GB (or larger) flash drive
- A **laboratory notebook** to stay in class
- A notebook for notes, discussions, free-writes, ideas, etc.
- 2" three-ring binder
- Headphones/ear buds

Not Required; Highly Recommended:

- Technology with internet access (Chromebook, MacBook, etc.)
- Fred and Theresa Holtzclaw's *Preparing for the AP Biology Exam*, copyright 2013 by Pearson Education, Inc.

Other Details:

- The purpose of classroom assignments is to provide students opportunities to practice and receive feedback in order to prepare for unit assessments. Thus, turning in assignments directly before or after a unit assessment provides no benefit. Students are expected to take responsibility for their learning by completing and turning in assignments on time. If an emergency comes up or the student will be gone it is the student's responsibility to plan ahead and see me before the due date. Life happens and late work is unavoidable. However, I do ask that you communicate with me. If late work comes to be your pattern, we will have a private discussion before it become a habit in order to diagnose the issues you are having. Habitual late work will not be accepted, just as it is not accepted in the larger world.
- In order to be successful in this class students need to be here, prepared, and on time every single day. However, I understand emergencies and illness are part of life. In the event that a student is absent it is **the student's responsibility** to complete missed class work. My website contains both a calendar and unit assignments. If an absence is known in advance, please communicate with me. I will follow the school's absence policy strictly.

- Being tardy distracts classmates, and me, and should only occur if your tardy is completely unavoidable. If the door is locked, we will not stop class to let you in. Don't knock repeatedly. It is not the responsibility of students who were on time to stop their learning to open the door for you. Have a seat and wait. I'll come open the door when the time is appropriate. I will follow the school's tardy policy. Not all labs will be available after class and making them up will be subject to my discretion.
- **If you cheat you're done.** You will receive a zero for any cheating or academic plagiarism that I catch and may be subject to expulsion from the class and the school. Just don't do it. It's such a dumb move.

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AP Biology Course Contract:

By signing this agreement, you are agreeing to all regulations expressed in this document and expressing your intent to abide by them. I am very firm in following these regulations. I want you to be successful and have your best shot at obtaining college credit through this course. I take it very seriously and expect that you will too.

_____ _____

Student Name (Printed) **Date**

_____

Student Name (Signed)

_____ _____

Parent Name (Signed) **Date**

This document is due on: _____

Remove this page of the syllabus and turn it in on or before the date indicated above. The first eight pages of the syllabus should be organized in your three-ring binder for reference throughout the course. Good luck and welcome to AP Biology!