

Biology for New AP Teachers - APSI Syllabus

TENTATIVE

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Note: all handouts and PowerPoints are accessible in the shared Google Drive

(Please tell me if one is not so I can scan it in)

Day 1: Evolution

Block	Activities	Materials needed
1	<p>Introductions, Housekeeping, Orientation of room and set-up; Overview of Big Ideas, Enduring Understandings, Essential Knowledge, Science Practices, and Learning Objectives; Discuss correlation guides to get sense of what is in and what is not.</p> <p>Introductions: What is your name? Where do you teach? Teaching experience / AP Biology experience? Length of class periods? Where did you go to college? Other interesting facts?</p> <p>Announcements: 1. I take the approach to present to you as much as possible, so I do most of the prep work on Sunday or before and after each session. I will certainly talk to you about set-ups and logistics, but <u>I invite you to stay after or come early to participate.</u></p> <p>2. I will have many extras set up on the side for your examination that we will discuss but not do – once again, feel free to come early or stay late to examine and play with them.</p> <p>3. Last day freebie lottery</p> <p>Norm Setting: Be respectful of others. Be helpful. Be on time. We are professional adults - leave as needed. Help us stay on topic, especially during discussions. Limit the sidebar conversations during discussions. ASK QUESTIONS. Contribute. It's ok to be wrong - we are here to learn and grown.</p> <p>Go through materials on your desk</p> <p>Curriculum Framework:</p> <ul style="list-style-type: none"> Unpack Illustrative Examples – pp. 17 – 21 <ul style="list-style-type: none"> Read Definition of Illustrative Complete # 1 on p. 21 with partner Group discussion Exclusion Statements – pp. 22-23 <ul style="list-style-type: none"> Obvious definition Group discussion 	<ol style="list-style-type: none"> 1. College board materials <ol style="list-style-type: none"> a. workshop manual b. Plasmodium module c. lab manual 3. address requests from donors / supply companies + google sheets roster 4. Attendance sheet 5. Power Point
2	<p>Web activity: Use search engine to find the AP Biology course page on AP Central and then find:</p>	<p>computer</p> <p>Handout - directions for Osmosis lab</p> <p>Web activity link: http://apcentral.collegeboard.com/home</p>

	<ol style="list-style-type: none"> 1. AP Course Description - consider saving a copy on your desktop. Peruse as time allows 2. Lab Manual, Lab Resources (list of support links for all labs), Links to each lab, PDF's of individual labs, etc. Be sure to locate the teachers' lab manual too. YOU'LL NEED TO USE THE SEARCH TOOL 3. Released free response questions (FRQ's) their rubrics and student samples. 4. Quantitative skills guide 5. Online two module professional development on quantitative reasoning. 6. Audit site - set up account; once you do, find secure resources. 7. If you can access the audit site then find the AP community, score reports, secure resources. Join now if possible. While we are at it, join the Facebook AP Biology Community. <p>Lab Set-up: set-up potato cores for Osmosis Lab and pour transformation plates.</p>	
3	<p>FRQ Test: 10-point question - you are a student for the next 22.5 minutes :).</p> <p>FRQ analysis: Use the rubric and score your response with focus on the connection between the course and the exam. "it is a skills-based test". Teach a quality Biology course with a concentrated focus on the science practices.</p> <p>When complete, read the student performance Q&A for this question in the share folder.</p> <p>Pair Share: this is just an overview so notes not essential at this point.</p> <ol style="list-style-type: none"> 1. Divide the 7 practices between your small group. P.193 in big blue 2. Read your assigned science practices. 3. For your assigned practices, define them, how do you or could you use these intentionally every day to prepare your students for the exam. 4. What practices seem to be troublesome. <p>The LO / Science practice Grid - Peruse - what information does it provide you?</p> <p>Graphs in AP Biology - a resource I hand out the first week of school</p>	<p>Handout - Blank question AP Central - rubric</p> <p>Handout and AP Central - student performance Q&A.</p> <p><u>Share Folder</u> - The LO / SP Grid</p> <p><u>Share Math Folder</u> - Graphs in AP Biology</p> <p>Handout - 2016 student samples (college board materials)</p>
4	Begin Evolution Unit Overview –	Handout - Biozone Stats Sample

	<ol style="list-style-type: none"> 1. Hardy Weinberg lecture - how to solve for allele frequencies if the population is in or out of equilibrium 2. Traditional Population genetics lab 3. Using HHMI to teach HW (just show resource and rock pocket) 4. Using Biozone and traditional population genetics lab to teach HW (Do this activity and sample problems); HW on the Exam – Problem solving 	<p>Biozone books - http://www.thebiozone.com/</p> <p>http://www.hhmi.org/biointeractive</p> <p>http://www.hhmi.org/biointeractive/award-winning-resources</p>
5	<p>Introduction to stats and spreadsheets</p> <p>Standard Deviation and Standard Error of the Mean:</p> <ol style="list-style-type: none"> 1. Why Stats in Biology - Handout 2. Mathbench: work through 1 - 10 in table of contents for this module. 3. Bozeman Biology: listen to his presentations on Standard deviation and Standard Error of the Mean 4. Activity - Activity - width of hand 5. Chi Square Hypothesis Test using M&M's and spreadsheets 6. Other resources / activities 7. New resources from college board 	<p>Shared math folder - The test is positive</p> <ol style="list-style-type: none"> 1. Shared math folder - why stats in biology 2. mathbench link for graphs and error bars: http://mathbench.umd.edu/modules/prob-stat_bargraph/page01.htm 3. Bozeman link for SD and SE of the mean :http://www.bozemanscience.com/biology-main-page/ <p>https://www.youtube.com/user/bozemanbiology</p> <ol style="list-style-type: none"> 4. Handout - width of the hand 5. Shared math folder - sample data m&ms spreadsheet 6. http://www.hhmi.org/biointeractive/diet-and-evolution-salivary-amylase 7. http://www.nature.com/news/scientific-method-statistical-errors-1.14700
6	<p>Mathematical Modeling:</p> <ol style="list-style-type: none"> 1. Quick Overview of Traditional HW lab (Do two examples of mating); 2. Investigation 2 Mathematical modeling: Hardy Weinberg – create model that is at HW equilibrium. Homework – tweak model to violate HW = evolution. COMPUTER LAB or laptops 	<p><u>Share Folder labs</u> - Traditional Lab Population Genetics <i>Lab Manual</i> – Investigation 2 Mathematical Modeling - https://www.youtube.com/watch?v=eDKcq_ND94g Video directions for lab 2 -</p>

		Share Labs Folder - samples of student mathematical models for Part I and Part II.
7	Cladograms – ENSI site cytochrome c; HHMI shells; Venn diagrams; Exam connections - this section may be moved to enzyme lab.	Cladograms http://www.indiana.edu/~ensiw/eb/home.html http://www.indiana.edu/~ensiw/eb/home.html
8	Set up Plants for transpiration Reflections Chi-Square - M&M's Pacing guide - You will be giving two hours, one each of the next two days, to work on any area you need.	5 plants per 4 people. <u>Share labs folder</u> – Transpiration M&M's Handout - Chi-Square <u>Shared planning folder</u> - My pacing guide
Homework	tweak model to violate HW = evolution.; Look at syllabi; Take m/c exam if you have not; read labs	
After hours	Make solutions for diffusion / osmosis;	

Day 2: Evolution continued and Cellular Processes: transport,

Block	Activities	Materials
1	<p>Warm-up question: So, The Test is positive? Make solutions: Make 1L of 1M solutions of your assigned solute. Use teachers' lab manual link on college board home page.</p> <p>Bioinformatics:</p> <ol style="list-style-type: none"> Discuss Exploring <i>Plasmodium</i> Evolution curriculum module –No time to do, but I encourage you to look at this and try it this week Very good but involved resource. GULO gene introduction to BLAST – lecture-independent pp and lab Investigation 3 – BLAST – one piece of evidence at a time – do this together using projection – COMPUTER LAB 	<p>attendance sheets announcements <i>Lab Manual</i> - Investigation 3 Blast Fossil genes are on CB website Handout and share folder labs- Parts 1 - 3 BLAST GULO and phylogeny lab</p> <ol style="list-style-type: none"> DNA Blast Protein Blast Open Reading Frames <p><u>Share Folder PowerPoint</u> - Blast <u>Share labs folder</u> - LINKS to mouse genes, mouse proteins.</p>
2	<p>Frq-2017 Question #1 - 22.5 minutes</p> <ol style="list-style-type: none"> In groups of two, find where in the text book as well as where in the curriculum framework information to answer this question is located. How are you going to get students ready for a topic they have never seen? <p>My Approach - use power point Investigation 1 - Artificial Selection:</p> <ol style="list-style-type: none"> Discuss my approach to group inquiry set-up / protocol Manipulate data Posters (Tri-folds and research posters) 	<p>Ap central- FRQ link - my data in shared folder blank and filled in data tables Investigation 1- lab manual PowerPoint - overview / pictures template for research posters nabt posters: http://www.kabt.org/2013/09/16/mini-posters-authentic-peer-review/</p>
3	<p>Inquiry in the classroom / How I teach my course</p> <ol style="list-style-type: none"> Inquiry Discussion in groups based on lab session length. Water activity (design an experiment to justify your claim or what evidence will support your prediction). Share in small groups what worked and what obstacles you encountered doing inquiry this year. Share out and discuss plans for doing inquiry this year. Discuss Investigation # 11 - Behavior 	<p>Handout-</p> <ol style="list-style-type: none"> Pacing Template

4	<p>Complete Investigation 4 - Diffusion and Osmosis:</p> <ol style="list-style-type: none"> 1. Prepare and find the initial mass of the dialysis/solution “cell” for the following 3 experiments: <ol style="list-style-type: none"> a. 1 M NaCl in beaker: 1 M Glucose in dialysis tubing. b. Distilled water in beaker: 1 M NaCl in dialysis tubing. Monitor with conductivity probe. You may want to compare dialysis tubing with baggies too. c. Distilled water in beaker: 5% Albumin in dialysis tubing. 2. Discuss results – water potential 	<p>Handout: Directions for osmosis experiment from yesterday Graph Paper - use carbonless lab books</p>
5	<p>Investigation 4 Continued - Surface Area to Volume:</p>	<p>Use Wards Kit but show directions in lab manual Handout: Directions for osmosis experiment (google doc) - same form used for dialysis tubing. Kim Foglia’s site: http://www.explorebiology.com/apbiology/ (teacher vault needs username and password) Un: rosalindfranklin Pw -photo51</p>
6	<p>Transpiration lab:</p> <ol style="list-style-type: none"> 1. mass whole plants <p>Alternative to whole plants: Obtain two or more sturdy leaves and place them in individual graduated cylinders. Add enough water so the meniscus is at the highest number possible.</p> <ol style="list-style-type: none"> 2. Place a thin layer of oil on the top to prevent water loss. 3. Record and place in an environmental condition - remember we need a control too. I have not done this before so remember to check changes periodically so we can see if this will work in one class period, one day, etc. <p>Stomata Peels: Prepare stomata peels for a leaf and calculate the stomatal density.</p>	
7	Evolving enzymes and cladograms	Handout - Bioinformatics and Evolving Enzymes
8	Reflection/planning	

Homework	Take Multiple choice exam in one sitting – 90 minutes for each section	
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Day 3: Energy

Block	Activity	materials
1	<ol style="list-style-type: none"> 1. Warm-up Problem: 10 point FRQ 2. Debrief Day 2 3. Exam <ol style="list-style-type: none"> a. description b. strategies (MC, Grid-ins, FRQ's) c. prep <ol style="list-style-type: none"> i. warm-ups ii. all year 4. Smanik et. all pacing guides - How do I teach AP Biology in 160 days 	Attendance sheet Blank form with FRQ's Word doc with EK's in Units CB - textbook alignment Handout – review sheet Handout – math review Biology Junction: http://www.biologyjunction.com/#MY_CLASSROOM_MATERIAL PowerPoint
2	Transformation Lab.	Handout - Bio-rad quick guide to transformation lab Full kit manual: http://www.bio-rad.com/webroot/web/pdf/lse/literature/1660033.pdf
3	Activities: <ol style="list-style-type: none"> 1. Fishbowl discussions on GMO's and Human Impact; 2. Summer homework 3. Recombinant DNA handout; 4. Flinn Cancer Karyotypes; 5. 3D molecular 6. More HHMI 7. others 	access to mastering biology and biolab for Pearson - use link file:///C:/Users/user/Downloads/MasteringFlyer_GeneralPreview_Opt5.pdf
4	Investigation: Photosynthesis Leaf Disc Challenge - get five discs to rise to the top in the shortest amount of time over (two?) trials. Hint: discuss what variables you can control and control them :).	<i>lab manual</i> - Leaf Disc Lab Author showing Leaf Disc procedure https://www.youtube.com/watch?v=vw8baZO89oc
5	Transpiration one leaf / mass whole plant / stomatal peals	
6	New Lab - Bio-Rad Photosynthesis and Respiration - discuss only Respiration: (may need to demo and leave on side for observations) <ol style="list-style-type: none"> 1. mini-respirometers 2. Vernier probes 	
7	Enzyme Challenge: If time run evolving enzymes simultaneously Toothpickase: <ol style="list-style-type: none"> 1. Use toothpicks and manipulatives to answer the following: 	Handout - Evolving Enzymes Toothpickase lab

	<ul style="list-style-type: none"> a. produce a graph that represents the rate of toothpickase (broken toothpicks per time) as the concentration of substrate increases for a set number of enzymes (3 people?). b. Produce a graph using the same axis (rate vs. substrate concentration) and the same number of enzymes but not with 20% plastic toothpicks. Why is this called competitive inhibition. c. Determine how you could model non-competitive inhibition and then repeat (a) above (no plastic toothpicks). 	
8	Reflection / work time	
Homework	Mass plants; analyze exam results;	

Day 4: Interactions / Regulation

Block	Activity	materials
1	<ol style="list-style-type: none"> 1. Warm - up Question - Use International from last year 2. Debrief Day 3; 3. Equity and Access; Pre-reqs.; Discuss: what do I teach, when do I teach it and what labs am I doing? 	Attendance sheet
2	<p>Primary Papers in the classroom</p> <ol style="list-style-type: none"> 1. Read a primary research paper or a part and answer exam type questions. <ol style="list-style-type: none"> a. Read the abstract and design an experiment that would answer the question. b. Read the procedure and ID the major components of the experiment (DV, IV, control, etc.). c. Identify the question that the researcher is trying to answer and describe the evidence that would support the researcher's hypothesis / prediction. d. Analyze the data...what conclusions can be drawn? 	http://www.hhmi.org/biointeractive/mo deling-regulatory-switches-pitx1-gene- stickleback-fish
3	<p>Post Lab Transformation Analysis and Discussion</p> <ol style="list-style-type: none"> 1. what is the role of each plate? 2. explanation of plasmid 3. calculation of transformation efficiency 4. Antibiotic discs how can we use them? 5. Bacterial growth using HB 101 K-12 (copper?) 	transformation lab questions using lab manual pp. 32-52 http://www.bio- rad.com/webroot/web/pdf/lse/literatur e/1660033.pdf
4	<p>Post Lab: Transpiration: If we want to compare two plants, what calculations will accomplish this?</p> <ol style="list-style-type: none"> 1. Calculate the rate of transpiration 2. Make a stomatal peel of the endpoint leaf. 3. discuss one leaf/graduated cylinder as a viable alternative 	
5	Investigation 12 – behavior or electrophoresis	
6	population Growth Handout; Catch -up	
7	Debrief Day 4 and week; evaluations; raffle and closure	
8		

Graduate Credit:

1. Possible ASSIGNMENT: The Use of Case Studies to teach scientific thinking. Teams will be assigned – Select a case study that addresses a big idea, prepare a presentation for the group. Use Handout as Guide.
2. Possible Assignment: Find a paper, it does not need to be a primary but why not? :) write a few “exam type” questions that the students will need the paper to answer. For example: Identify question, hypothesis, independent and dependent variables, control, etc.; What piece of evidence from this experiment would support their claim?; What is their claim? Why are they doing this experiment? What are some ethical questions you might have?