Lenoir City High School

AP Biology

SY 2016-17
M-F 3rd Block, 1st & 2nd Semester

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Course Overview

All students need an opportunity to experience science as a process and not just learn biology as a collection of unrelated facts. This means that the course should emphasize how scientists use their observations and readings to ask questions that can lead to new experiments. These experiments build on the work of others and eventually lead to additional evidence on different topics. This investigative process will be used throughout this AP Biology course. It is important for students to become excited with discovery as they ask and answer their own questions about natural/biological phenomena that they see, read about, or experience in the laboratory and field. In addition, it is critical that students connect new concepts with what they know, with each connection they help themselves build a solid framework of biological knowledge and scientific know –how.

Textbook

Reece, J., Urry, L., et. al. (2014). Campbell Biology 10th edition, AP edition. Pearson Education, Inc.

- Online Textbook: Mastering Biology Course: **MBKING95696**
- Test Prep Series for AP Biology
- BioZone Workbook 1 & 2- AP Biology

Course Organization

The goal of AP Biology is to create a culture of life-long learners, where students are informed citizens who have the tools and the critical thinking skills to analyze and respond to issues that arise in our ever-changing society. Students will be expected to develop **essential knowledge** of **enduring understandings** (core concepts) for what is referred to as the 4 "**Big Ideas**". Students will also be expected to use the **7 science practices** to make predictions, develop and refine testable explanations for natural phenomena. The Big Ideas and Science Practices can be found on pages vi- ix in the AP Biology textbook, titled the *Curriculum Framework*.

The four Big Ideas: The big ideas are interrelated, and they will not be taught in isolation. The course will connect the enduring understandings from one big idea with those of the others wherever practical. Students will maintain a

Things to Remember

Monday, May 8, 2017
AP Biology College Board Exam
Fee waivers: www.collegeboard.com

Required Materials
Chrome book, 3-ring binder, loose leaf paper, pens, pencils, highlighters, colored pencils, and calculator.

Supplemental Materials
AP Biology Lab Manual, scientific articles and non-fiction novels. Websites: Howard Hughes Medical Institute, Human Genome Project and BLAST.

Additional
AP Biology t-shirt $7, field trip fee may apply at a later date (to be determined)

Summer Project
Experimental Design

Lab Practicals
Students will complete a minimum of the 13 recommended inquiry based investigative labs for AP Biology. Additional investigations may be used if time permits. Lab fee: $20.00

Course Credit
Semester 1= 3 Hon. Biology II
Semester 2= 5 AP Biology

curricular map of the big ideas and enduring understanding showing connections as they are made by the students themselves.

The four *Big ideas* are:

- *Big idea 1:* The process of evolution drives the diversity and unity of life.
- *Big idea 2:* Biological systems utilize free energy and molecular building blocks to grow, to reproduce and to maintain dynamic homeostasis.
- *Big idea 3:* Living systems store, retrieve, transmit and respond to information essential to life processes.
- *Big idea 4:* Biological systems interact, and these systems and their interactions possess complex properties

Examples illustrating Big Ideas and the types of connections to be made throughout the course:

Big idea 1 and 3: **[CR3a]**

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

EU 3.A: Heritable information provides for continuity of life.

- DNA and RNA are carriers of genetic information through transcription, translation and replication. (LO 1.15) Students will model information flow in a kinesthetic activity and discuss the similarities in the process among different domains. DNA replication ensures continuity of hereditary information. (LO 3.3) (This is an example of a student activity that will connect enduring understandings between different big ideas and is an example of what students will do throughout the course).

3B: Big idea 1, 2 and 4: **[CR3a] & [CR3b]**

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

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

EU 4.1: Interaction within biological systems lead to complex properties.

- Electron Transport Chain (ETC) and chemiosmosis kinesthetic activity. Students build an inner mitochondrial membrane out of a variety of materials and identify the membrane as a feature allowing separation within the cell. Students explain and justify how this separation is achieved in prokaryotes to generate a proton gradient, and they will present the evolutionary connections across domains through a BLAST search for proteins in the ETC. **[CR4a] & [CR4b]**

3C: Big idea 1 and 3: **[CR3a] & [CR3c]**

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

EU 3.A: Heritable information provides for continuity of life.

- Students will participate in a Hardy-Weinberg activity where they calculate allelic frequency change. These alleles will be connected to DNA and related back to the evolutionary history of the organisms being studied. In a second part of this activity, students will investigate the role of environmental change in the changing genetic make-up of a population.

[CR4a] & [CR4c]

3D: Big idea 1 and 4: **[CR3a] & [CR3c]**

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

EU 1.C: Life continues to evolve within a changing environment. Students will track the changing flowering phenology of particular species of flowering plants across a wide territory (such as North America or Europe) or the changing flight patterns of migratory insects or birds in relation to global climate change.

- Students are provided with opportunities to meet the learning objectives within each of the big ideas. These opportunities must occur outside of the laboratory investigations.
- The science practices and the learning objectives are used throughout the course. All activities and class work will be connected to at least one learning objective that will be clearly communicated to students so they can see the science practices and learning objectives as the framework around which the learning of the course takes place. The science practices and learning objectives will also be addressed in classroom activities and projects external to the formal lab investigations. Representative examples of activities are below:

4A: Students will participate in a Hardy-Weinberg simulation as a class activity. Within this activity, students will make predictions and test them using mathematical models to study population genetics. (LO 1.6)

- Students will chose several organisms to investigate some aspect of their evolutionary relatedness. Students will narrow down an appropriate, under-explored question about the organism of their choice through research, and develop testable hypotheses. Students will share research results. (LO 1.16)
- Students will examine evidence regarding speciation of major groups of plants and major extinctions on Earth. Students will plan, design, and carry out data collection plans to evaluate these scientific claims. (LO 1.21)

4B: Students will compare cells in different domains with regard to internal membranes and their function. Students will extend this analysis to an examination and application of scientific explanations in endosymbiont theory. (LO 2.13)

- Students will make short movies showing the relationship between molecular events and global cycles such as between photosynthesis/respiration and global carbon cycles. (LO 2.9)

4C: Students will work with models demonstrating the immune system, digestive system, action potential, action at the nephron, working of the sarcomere, and cellular communication, which allow students to problem solve as they change conditions within the model. Students will model the effect of change (for example disease or drugs) and communicate the results predicted due to the change. (LO 3.36)

- Students will select and read an article in a scientific journal on a medical procedure, device, drug trial, or similar event. Students will statistically analyze and evaluate the data and report on the findings. (LO 3.37)

4D: Students will identify, explain and justify how intracellular structures interact with each other, such as rough endoplasmic reticulum and the Golgi apparatus, or mitochondria and chloroplasts in plants, or the DNA inside the nucleus and the ribosomes outside the nucleus. (LO 4.18)

Lab Component

The laboratory experience is extremely important in the AP Biology course and is used to emphasize how biology is a scientific process, which involves development and testing of a hypothesis, collection and presentation of data, analysis, with a clear discussion of your results. To ensure the lab component of the course is met, on average, one day a week will be devoted to laboratory work. Students are required to come in to the laboratory prepared and ready to complete the day's procedure. Lab reports are to be completed at home and turned in by the posted due date.

The following AP Biology Investigative Labs will be conducted:

Investigation #	Title	Scientific Practices
1	Artificial Selection *(Big Idea 1)*	1, 2, 5, 7
2	Mathematical Modeling; Hardy Weinberg *(Big Idea 1)*	1, 2, 5
3	Comparing DNA Sequences to Understand Evolutionary Relationship with BLAST *(Big Idea 1)*	1,5
4	Diffusion and Osmosis *(Big Idea 2)*	2, 4, 5
5	Photosynthesis *(Big Idea 2)*	1, 2, 3, 4, 6, 7
6	Cellular Respiration *(Big Idea 2)*	1, 2, 3, 6, 7
7	Cell Division: Mitosis and Meiosis *(Big Idea 3)*	1, 5, 6, 7
8	Biotechnology: Bacterial Transformation (*Big Idea 3)*	1, 3, 5, 6, 7
9	Biotechnology: Restriction Enzyme Analysis *(Big Idea 3)*	3, 6
10	Energy Dynamics *(Big Idea 4)*	1, 2, 3, 4, 5, 6, 7
11	Transpiration *(Big Idea 4)*	1, 2, 4, 6, 7
12	Fruit Fly Behavior *(Big Idea 4)*	1, 3, 4, 5, 6, 7
13	Enzyme Activity *(Big Idea 4)*	5, 6, 7

Assessments

Students will earn a grade based on the quality and accuracy of the work they complete. Overall class grades are based on a straight percentage and are not based on a curve.

80%	Summative	
	40%	Exams (MC, Grid-in, Short FRQ's, Long FRQ's)
	40%	Labs, Projects (>30% based on Big Idea)
20%	Formative	
	10%	Quizzes, Classwork
	10%	Homework, Readings

Exams

At the end of each unit an exam will be given consisting of multiple choice, grid-in and free response questions fashioned after the AP Biology Exam. There will be a comprehensive final exam at the end of the semester. Final exams are typically multiple choice/grid-in and cumulative in nature.

Quizzes & Classwork

At a minimum, students should expect one quiz a week. Some quizzes will be announced and others will not. Quizzes will vary in format depending on the topic being discussed. All *classwork* will be posted on www.mrskingsbioweb.com on the daily assignment page. It is recommended that all students check the website on a regular basis for upcoming assignments and due dates.

Labs, Lab Reports and Projects (Revise)

Lab reports are required for each of the Inquiry-Based AP Biology Labs. These reports should be formatted using the scientific method [following the rubric provided by Mrs. King]. Students will work in teams to complete lab procedures, and are responsible for turning in professional quality lab reports by the due dates. Students are expected to produce high quality work and are given up to a week from the conclusion of the lab to submit their final papers.

Some labs may not require a formal report. In such cases, student's lab papers may include pre-lab questions, data/results, analysis, and post-lab questions which would be geared to emphasize the key concepts of the lab.

Students will be asked to design their own lab experiment to test a hypothesis. The students may be asked to conduct this experiment at home over a period of time and report back on their conclusions; i.e. During summer assignment. The student will propose in writing the scientific question they wish to investigate to Mrs. King. After question approval, students will formulate a hypothesis and design an experiment to test their hypothesis. Experimental designs are then peer-reviewed, redesigned if needed, and conducted by the student out of class. This project gives the student a chance to be creative and apply the scientific method. Students should work individually on the project and submit a formal lab report.

Homework & Readings

Homework may take many forms and is designed to help with student understanding of the current unit being studied. Assignments may include, but are not necessarily limited to, the following; completion of concept maps, virtual labs, take an online self quiz and justify why the answers are correct, completing the chapter review at the end of a chapter, or answering AP style free response questions related to the unit and justifying why they are correct. *Readings* for each unit include chapters from the textbook containing important information that will be discussed in class. Scientific journal readings or abstracts may be assigned that relate to scientific discovery and demonstrate the scientific process.

Late work

- One day late – reduced a letter grade
- Later, no more than half credit
- *No work will be accepted once work has been passed back to students

Communication

Students will maintain a laboratory notebook throughout the course. In addition to the laboratory notebook, students will communicate to others in formats such as group presentations, PowerPoint presentations, poster sessions, video feeds, blogs, and written reports. Communication tools are not only for the laboratory experiences, but represent examples of the collaboration, reflection, and articulation seen in the course as a whole. Students will use this collection of their work over time and reflect on the changes they can see in the quality or substance of their work through the year as they prepare to move into college courses and research experiences in the future. A key feature in the portfolio will be the requirement for student self-reflection in terms of the science practice skills that they have developed throughout the year.

Social and Ethical Concerns

It is vitally important that students connect their classroom knowledge to socially important issues. The course will allow students to learn about and discuss many issues in a variety of formats. Issues will be discussed in a class setting, both live and electronically through such programs as Goggle Classroom, and students may research and report on a current topic that has social or ethical issues associated with it. Since the goal will be to discuss a timely event, the list below should be seen as illustrative as new issues continually appear.

- Stem Cell Research (Big Idea 3)
- Global Warming/Climate Change (Big Idea 4)
- Antibiotic Resistance and the Problems with Improper Antibiotic Use (Big Idea 1)
- Genetically Modified Food (Big Idea 3)
- The Use of Genetic Information (Big Idea 3)

AP College Board Exam Overview

May 8, 2017

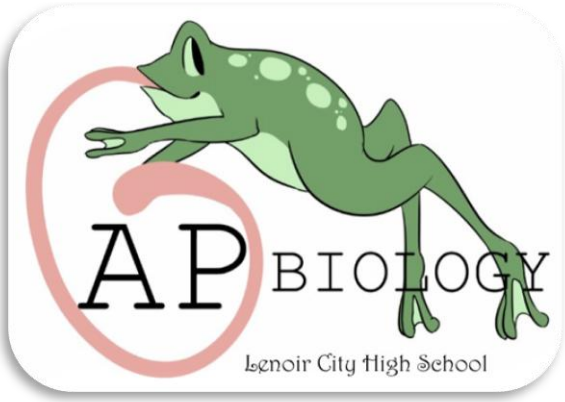
All students are expected to sit for the May 8th exam.

3 Hour AP Biology Exam				
Section	**#**	**Question Type**		**Time**
I	63	Multiple Choice (knowledge & science practices)	50 %	90 minutes
	6	Grid –in (science & math skills)		
II	2	Long Free Response (one lab or data based)	50%	10 min. to read 80 min. to write
	6	Short Free Response (each requiring paragraph-length argument/response)		

Section II: 2 ten–point questions, 3 four-point questions, and 3 three-point questions

AP Exam Scores

- 5 – Extremely well qualified
- 4 - Well qualified
- 3 - Qualified
- 2 – Possibly qualified
- 1 – No recommendation



Cheyenne Vest designed our t-shirt 2015-16 school year

Statement of Understanding

Please sign and return the next page to Mrs. King by the due date.

Advanced Placement Biology

2016-2017

STATEMENT OF UNDERSTANDING

The AP Biology course is designed to be the equivalent of a college-level introductory biology course. The intent of the course is to expose students to higher-level biological principles, concepts, and skills and allow them the opportunity to apply their knowledge to real-life applications. All students need an opportunity to experience science as a process and not just learn biology as a collection of unrelated facts. This means that the course should emphasize how scientists use their observations and readings to ask questions that can lead to new experiments. These experiments build on the work of others and eventually lead to additional evidence on different topics. This investigative process will be used throughout this AP Biology course. It is important for students to become excited with discovery as they ask and answer their own questions about natural/biological phenomena that they see, read about, or experience in the laboratory and field. In addition, it is critical that students connect new concepts with what they know, with each connection they help themselves build a solid framework of biological knowledge and scientific know –how.

Students should plan on spending a minimum of 30 minutes a night on AP Biology, with occasional extended time requirements. If there is not a specific assignment for the evening, students should be: brushing up on *Prior Knowledge*, reading related chapters in the text book, reviewing vocabulary/command terms and devising memory techniques, working on the *"You Must Know"* concepts from the Pearson Test Prep workbook, completing concept checks in the textbook or working on practice quizzes and review concepts on the Mastering Biology website.

By signing this agreement, the parent and the student acknowledge that they have read the AP Biology Syllabus for Mrs. King's AP Biology class and they understand and agree to the commitment necessary to be successful in this rigorous biology course.

Printed Student Name

Signature of Student Date

Signature of Parent Date

Please return signed STATEMENT OF UNDERSTANDING to Mrs. King by August 8, 2016