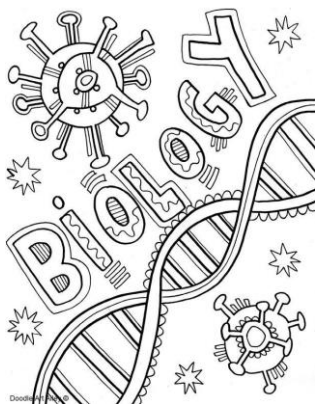


Advanced Placement Biology Syllabus

2020-2021



Course Title: Advanced Placement[®] Biology

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Course Description: Advanced Placement[®] (AP[®]) Biology is designed to be equivalent to a college introductory biology course. AP[®] Bio differs significantly from traditional high school biology due to complexity and depth of content, as well as time and effort required to achieve mastery. The course revolves around performing scientific practices as well as knowing scientific content from all areas of life science.

Materials: Virtual- laptop, webcam, textbook, notebook, writing utensil

In person- Bring to class each day (see me if this is a concern): a notebook, folder or binder, and writing utensils

Textbook: Principles of Life 2nd edition (Hillis, David M., et al. *Principles of Life*. 2nd ed., Sinauer Associates, 2017). Students will also be issued [5 Steps to a 5](#)

Approximate Course Outline: This class is 90 minutes Monday-Friday, all year

- Unit 1: Ecology, Chs. 40-45 (2-3 weeks)
- Unit 2: Molecular Biology, Chs. 2-3 (3-4 weeks)
- Unit 3: Cells, Chs. 4,5,25 (4-5 weeks)
- Unit 4: Cellular Energy, Ch. 6 (2-3 weeks)
- Unit 5: Heredity, Chs. 7-9 (3-4 weeks)
- Unit 6: Gene expression and Biotechnology, Chs. 10-13 (4-5 weeks)
- Unit 7: Natural Selection Chs. 14-17 (4-5 weeks)
- AP Exam Prep and Practice, Ch. 1 (2 weeks)
- Final Research Project (4 weeks)

Topic Areas: AP[®] Biology is structured around four big ideas outlined by the College Board[®]: Evolution, Energy, Information, and Systems, as well as science practices detailed by the Next Generation Science Standards. See the attached documents for more specifics.

Practice: There will be many activities to serve as learning opportunities, which may look like hands-on activities, mini-projects, labs, discussions, worksheets, practice tests, etc. These may not be formally graded; they are important to complete in order to learn the information and practice the skills before the formal assessment and may be used to provide feedback and gauge progress. They will also factor in to a student's Habits of Work and may be used as evidence of readiness for an assessment or reassessment. If activities are not completed during class they may be assigned to complete at home. It is the student's responsibility to keep past assignments organized as evidence of progress.

Homework: Students will be responsible for reading the textbook outside of class in order to be prepared to engage with the material in class. Additional assignments and informative videos may be given as needed.

Laboratory: Approximately 25% of instructional time will be spent in lab activities. Students need to be prepared to engage in the activities and uphold appropriate laboratory behavior any time they are in class. Effective participation in labs is essential to attaining proficiency. A breach in the lab safety contract can result in removal from the activity and potential disciplinary action.

Final Project: After the AP Exam, there are still 4 weeks of school. These will be used to enrich learning via a student-choice research project. Students are expected to engage in learning until the close of the school year.

Assessment: Students will be assessed on the accompanying course standards. There will be a variety of assessments types, including projects, tests, labs, quizzes, and College Board released example AP[®] Biology Exam questions. Specific expectations will be provided for each assessment.

Note: Passing the course and passing the AP[®] Biology exam are not the same. The exam will not have an effect on the course grade, and passing the course does not guarantee a good score on the exam.

AP Exam:

AP EXAM: FRI, MAY 14, 2021, 8 AM

Exam Format

Starting with the 2021 exam, the AP Biology Exam will have question types and point values that will remain stable and consistent from year to year, so you and your students know what to expect on exam day.

Exam Updates

Starting with the 2021 Exam

Section I: Multiple Choice

60 Questions | 1 Hour 30 Minutes | 50% of Exam

Score

- Discrete questions.
- Questions in sets.
- Grid-in questions have been removed. (Note that multiple-choice questions still assess mathematical calculations.)

Section II: Free Response

6 Questions | 1 Hour 30 Minutes | 50% of Exam Score

- 2 long questions, both focusing on interpreting and evaluating experimental results (one requires graphing)
- 4 short-answer questions
 - o Scientific Investigation
 - o Conceptual Analysis
 - o Analysis of Model or Visual Representation
 - o Analysis of Data

Exam Tasks and Content

Section 1: Multiple Choice

- Individual questions
- Sets of questions with 4–5 questions per set

Section 2: Free Response

- There are 2 long questions and 4 short-answer questions. Long questions are worth 8–10 points each; short-answer questions are worth 4 points each.
- The long questions ask students to:
 - Interpret and evaluate experimental results
 - Interpret and evaluate experimental results with graphing
- The short-answer questions assess students' understanding of the following:
 - Scientific investigation
 - Conceptual analysis
 - Analysis of a model or visual representation
 - Data analysis

AP Calculator Policy and Equations and Formulas Sheet

A four-function (with square root), scientific, or graphing calculator may be used on the exam.

Students are permitted to use the [AP Biology Equations and Formulas Sheet](#) on the exam. This resource is also available in Appendix A of the CED.

Classroom Expectations: The primary expectation in class is to maintain a respectful learning atmosphere.

Below are some ideas of what this looks like:

- Speaking and acting respectfully to each other, the teacher, and guests:
 - Appropriate language and interactions
 - Active listening
 - Clear communication about any concerns
- Respecting the space and the materials used:
 - SAFETY
 - Following directions
 - Keeping everything clean and functional (report any issues right away)
- Respecting the content
 - Keeping an open mind, trying new things
 - Being present - on time and engaged
 - Asking questions to help clarify the material

**Offer each other kindness and understanding:
We are all here to learn, we might not get it right the first time!**

This class is conducted at the college level and students are expected to work accordingly.

Cell phones and other devices will ONLY be used by teacher discretion. Students must ask before they use it. If teacher permission is not granted and a device is in use, it can be confiscated.

Absences: If a student is absent, they are responsible for checking in with me (outside of class) and making up required work. In the case of a planned absence, it helps if students let me know ahead of time so I can plan.

Support: I am here to help students achieve success. If a student has any questions and/or concerns I encourage them to contact me to discuss it as soon as possible. E-mail and Remind are the best way to reach me.

Science Safety Contract

Science investigations allow students to learn science through discovery. Many investigations utilize equipment and chemicals that must be used safely and responsibly. Science teachers will assure that you have a safe laboratory experience, but you must also do your part. Read the following safety contract. Signing the contract signifies you understand and will follow it. A parent or guardian must also sign so everyone is committed to safe laboratory practices. Virtual: By reading the below parameters and proceeding with the course, you are agreeing to the following.

1. Follow all written and verbal instructions as directed by the teacher.
2. Never attempt unauthorized experiments. Do laboratory work only when the teacher is present.
3. Keep the work area clear of everything except laboratory materials.
4. Food and drink are NOT allowed in the laboratory area. Do not chew gum. When using chemicals or preserved specimens, keep hands away from face, eyes, mouth, and body.
5. Students are not permitted in any chemical storage room.
6. Never run in the laboratory. To prevent accidents, be aware of your environment at all times.
7. Your teacher will describe the location of exits and all safety equipment. Know where the closest fire alarm is.
8. Use equipment (balances, Bunsen burner, etc.) in the correct way, as instructed by the teacher.
9. Properly dispose of broken glassware and other sharp objects in designated areas.
10. Any time chemicals, heat or glassware are used, students, teachers, and visitors will use laboratory goggles. Lab aprons must be used when there is danger of chemical spills or biological contamination.
11. Long hair must be tied back and dangling jewelry and baggy clothing are not appropriate. Shoelaces must be tied and sandals are not allowed.
12. Immediately report any spills, accidents, or injuries to the teacher.
13. If a chemical splashes in your eye(s) or on your skin, flush with water. Inform the teacher immediately.
14. Never touch, taste, or smell chemicals or other substances unless directed to do so.
15. Follow all provided instructions when handling chemicals.
16. Follow all provided instructions when handling glassware, equipment, and when heating substances.
17. Never point the open end of a test tube containing any substance at yourself or others.
18. Dispose of all chemical and biological waste properly. The teacher will tell what materials can be poured down the drain and what materials must be placed in a waste container.
19. Clean all work surfaces and equipment at the end of laboratory work and return all equipment to the proper storage area.
20. Wash your hands with soap and water after performing all investigations and before you leave the lab area.
21. If you are unclear or confused about proper safety procedures and/or laboratory instructions, ask the teacher before proceeding.

ADDITIONAL, SPECIFIC INSTRUCTIONS WILL BE GIVEN PRIOR TO LABORATORY ACTIVITIES.

The Big Ideas from College Board:

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

AP[®] Biology Assessed Course Standards

An asterisk (*) represents a required performance indicator

Standard #1: The various interactions between abiotic and and biotic components in the environment

Performance Indicators: Student will be able to explain...

- **APB1.1:** Responses to the environment
- **APB1.2:** Energy flow through ecosystems
- **APB1.3:** Population ecology
- **APB1.4:** Effect of density of populations
- **APB1.5:** Community ecology
- **APB1.6:** Biodiversity
- ***APB1.7:** Unit overview
- ***APB1.8:** Ecology Lab
- ***APB1.9:** Animal Behavior Lab

Standard #2: The chemical structures and interactions that make up living organisms

Performance Indicators: Student will be able to explain...

- **APB2.1:** The elements of life, water, and hydrogen bonding
- **APB2.2:** Structure, function, and properties of carbohydrates
- **APB2.3:** Structure, function, and properties of lipids
- **APB2.4:** Structure, function, and properties of nucleic acids
- **APB2.5:** Structure, function, and properties of proteins
- **APB2.6:** Enzyme function including environmental factors
- **APB2.7:** Biochemical interactions
- ***APB2.8:** Unit overview
- ***APB2.9:** Enzyme Activity Lab

Standard #3: Cells are the basic units of life and have many complex interactions

Performance Indicators: Student will be able to explain...

- **APB3.1:** Cell structure and function: subcellular components
- **APB3.2:** Plasma membranes and mechanisms of membrane transport
- **APB3.3:** Tonicity and osmoregulation
- **APB3.4:** Plant nutrition and transport
- **APB3.5:** Cell compartmentalization, including origins
- **APB3.6:** Cell structure and signaling
- ***APB3.7:** Unit overview
- ***APB3.8:** Diffusion and Osmosis Lab
- ***APB3.9:** Transpiration Lab

Standard #4: The chemical reactions and processes that transform energy in cells

Performance Indicators: Student will be able to explain...

- **APB4.1:** Cellular energy
- **APB4.2:** Photosynthesis
- **APB4.3:** Anaerobic Respiration
- **APB4.4:** Aerobic Respiration
- **APB4.5:** Oxidative Phosphorylation
- **APB4.6:** Fitness
- ***APB4.7:** Unit overview
- ***APB4.8:** Photosynthesis Lab
- ***APB4.9:** Cellular Respiration Lab

Standard #5: How organisms store and transfer genetic information

Performance Indicators: Student will be able to explain...

- **APB5.1:** The cell cycle and mitosis
- **APB5.2:** Meiosis and genetic variation
- **APB5.3:** Mutation and Apoptosis
- **APB5.4:** Mendelian genetics
- **APB5.5:** Non-Mendelian genetics
- **APB5.6:** Environmental effects on phenotypes
- **APB5.7:** Chromosomal Inheritance
- ***APB5.8:** Unit overview
- ***APB5.9:** Cell Division Lab

Standard #6: How genes are expressed and can be altered using technology

Performance Indicators: Student will be able to explain...

- **APB6.1:** DNA and RNA structure and replication
- **APB6.2:** Transcription and RNA processing
- **APB6.3:** Translation
- **APB6.4:** Regulation of gene expression
- **APB6.5:** Gene expression and cell specialization
- **APB6.6:** Biotechnology
- ***APB6.7:** Unit overview
- ***APB6.8:** Restriction Enzyme Lab
- ***APB6.9:** Bacterial Transformation Lab

Standard #7: The diversity of life and how it changes over time

Performance Indicators: Student will be able to explain...

- **APB7.1:** Natural and artificial selection
- **APB7.2:** Population genetics and Hardy-Weinberg equilibrium
- **APB7.3:** Evidence of evolution and
- **APB7.4:** Common ancestry and the origin of life
- **APB7.5:** Phylogeny, Speciation and extinction
- ***APB7.6:** Unit overview
- ***APB7.7:** Mathematical Modeling Lab
- ***APB7.8:** Artificial Selection Lab
- ***APB7.9:** Comparing DNA Sequences Lab

Note: Within each performance indicator is a variety of themes, concepts, and terms that a student must show that they can apply effectively.

Science Practices from Next Generation Science Standards:

- SP1: Model: The student can use representations and models to communicate scientific phenomena and solve scientific problems.
- SP2: Math: The student can use mathematics appropriately.
- SP3: Query: The student can engage in scientific questioning to extend thinking or to guide investigations within the context of the AP course.
- SP4: Data Collection: The student can plan and implement data collection strategies appropriate to a particular scientific question.
- SP5: Analysis: The student can perform data analysis and evaluation of evidence.
- SP6: Explain: The student can work with scientific explanations and theories.
- SP7: Connect: The student is able to connect and relate knowledge across various scales, concepts and representations in and across domains.