CollegeBoard AP

AP BIOLOGY

AP Pacing Guide for Flipped Classrooms: Jan.–April 2021

Overview

Due to the challenges associated with hybrid and remote learning in 2020-21, a significant amount of the content and skills colleges are requiring for credit will likely need to be assigned to students as homework or independent learning. This guide allows students who are currently behind to complete all course topics from the course and exam description by May. This guide assumes students will complete approximately 30 minutes of AP Daily videos (~10 minutes each) and topic questions each day in lieu of, or addition to, assignments the teacher would ordinarily give.

How to Implement

This guide assumes students covered only ~23% of the course content and skills in the fall of 2020. For classes that have been forced off schedule, there may not be time for teacher-led instruction of all remaining topics.

- Teachers should **assign the AP Daily videos and topic questions** listed below as student assignments each week.
- Using the reports generated by the topic questions, teachers should focus their limited, direct class time on the Learning Objectives where students need more help.
- If students are ahead of the pace indicated below, teachers will be able to incorporate additional days or weeks to spend more time on challenging topics, practicing course skills, or reviewing for the exam.

Week 1: Jan. 4–8

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
4.1	Cell Communication	AP Daily Video 1	IST-3.A: Describe the ways that cells can communicate with one another. IST-3.B: Explain how cells communicate with one another over short and long distances.	Topic Questions

*Prioritize the most challenging Learning Objectives for your students for direct, synchronous instruction.

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
4.2	Introduction to Signal Transduction	AP Daily Video 1	IST-3.C: Describe the components of a signal transduction pathway. IST-3.D: Describe the role of components of a signal transduction pathway in producing a cellular response.	Topic Questions
4.3	Signal Transduction	AP Daily Video 1	IST-3.E: Describe the role of the environment in eliciting a cellular response. IST-3.F: Describe the different types of cellular responses elicited by a signal transduction pathway.	Topic Questions
4.4	Changes in Signal Transduction Pathways	AP Daily Video 1	IST-3.G: Explain how a change in the structure of any signaling molecule affects the activity of the signaling pathway.	Topic Questions

Week 2: Jan. 11–15

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
4.5	Feedback	AP Daily Video 1	ENE-3.A: Describe positive and/or negative feedback mechanisms. ENE-3.B: Explain how negative feedback helps to maintain homeostasis. ENE-3.C: Explain how positive feedback affects homeostasis.	Topic Questions
4.6	Cell Cycle	AP Daily Video 1 AP Daily Video 2	IST-1.B: Describe the events that occur in the cell cycle. IST-1.C: Explain how mitosis results in the transmission of chromosomes from one generation to the next.	Topic Questions
4.7	Regulation of Cell Cycle	AP Daily Video 1	IST-1.D: Describe the role of checkpoints in regulating the cell cycle. IST-1.E: Describe the effects of disruptions to the cell cycle on the cell or organism.	Topic Questions Personal Progress Check

Week 3: Jan. 18–22

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
5.1	Meiosis	AP Daily Video 1	IST-1.F: Explain how meiosis results in the transmission of chromosomes from one generation to the next. IST-1.G: Describe similarities and/or differences between the phases and outcomes of mitosis and meiosis.	Topic Questions
5.2	Meiosis and Genetic Diversity	AP Daily Video 1	IST-1.H: Explain how the process of meiosis generates genetic diversity.	Topic Questions
5.3	Mendelian Genetics	AP Daily Video 1 AP Daily Video 2 AP Daily Video 3	EVO-2.A: Explain how shared, conserved, fundamental processes and features support the concept of common ancestry for all organisms. IST-1.I: Explain the inheritance of genes and traits as described by Mendel's laws.	Topic Questions

Week 4: Jan. 25–29

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
5.4	Non-Mendelian Genetics	AP Daily Video 1 AP Daily Video 2	IST-1.J: Explain deviations from Mendel's model of the inheritance of traits.	Topic Questions
5.5	Environmental Effects on Phenotype	AP Daily Video 1	SYI-3.B: Explain how the same genotype can result in multiple phenotypes under different environmental conditions.	Topic Questions
5.6	Chromosomal Inheritance	AP Daily Video 1 AP Daily Video 2	SYI-3.C: Explain how chromosomal inheritance generates genetic variation in sexual reproduction.	Topic Questions Personal Progress Check

Week 5: Feb. 1–5

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
6.1	DNA and RNA Structure	AP Daily Video 1	IST-1.K: Describe the structures involved in passing hereditary information from one generation to the next. IST-1.L: Describe the characteristics of DNA that allow it to be used as the hereditary material.	Topic Questions
6.2	Replication	AP Daily Video 1	IST-1.M: Describe the mechanisms by which genetic information is copied for transmission between generations.	Topic Questions

Week 6: Feb. 8–12

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
6.3	Transcription and RNA Processing	AP Daily Video 1 AP Daily Video 2	IST-1.N: Describe the mechanisms by which genetic information flows from DNA to RNA to protein.	Topic Questions
6.4	Translation	AP Daily Video 1 AP Daily Video 2	IST-1.O: Explain how the phenotype of an organism is determined by its genotype.	Topic Questions

Week 7: Feb. 15–19

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
6.5	Regulation of Gene Expression	AP Daily Video 1 AP Daily Video 2	IST-2.A: Describe the types of interactions that regulate gene expression. IST-2.B: Explain how the location of regulatory sequences relates to their function.	Topic Questions
6.6	Gene Expression and Cell Specialization	AP Daily Video 1	IST-2.C: Explain how the binding of transcription factors to promoter regions affects gene expression and/or the phenotype of the organism. IST-2.D: Explain the connection between the regulation of gene expression and phenotypic differences in cells and organisms.	Topic Questions
6.7	Mutations	AP Daily Video 1 AP Daily Video 2 AP Daily Video 3	IST-2.E: Describe the various types of mutation. IST-4.A: Explain how changes in genotype may result in changes in phenotype. IST-4.B: Explain how alterations in DNA sequences contribute to variation that can be subject to natural selection.	Topic Questions

Week 8: Feb. 22–26

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
6.8	Biotechnology	AP Daily Video 1	IST-1.P: Explain the use of genetic engineering techniques in analyzing or manipulating DNA.	Topic Questions Personal Progress Check
7.1	Introduction to Natural Selection	AP Daily Video 1	EVO-1.C: Describe the causes of natural selection. EVO-1.D: Explain how natural selection affects populations.	Topic Questions
7.2	Natural Selection	AP Daily Video 1	EVO-1.E: Describe the importance of phenotypic variation in a population.	Topic Questions

Week 9: Mar. 1–5

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
7.3	Artificial Selection	AP Daily Video 1	EVO-1.F: Explain how humans can affect diversity within a population. EVO-1.G: Explain the relationship between changes in the environment and evolutionary changes in the population.	Topic Questions
7.4	Population Genetics	AP Daily Video 1	EVO-1.H: Explain how random occurrences affect the genetic makeup of a population. EVO-1.I: Describe the role of random processes in the evolution of specific populations. EVO-1.J: Describe the change in the genetic makeup of a population over time.	Topic Questions
7.5	Hardy-Weinberg Equilibrium	AP Daily Video 1	EVO-1.K: Describe the conditions under which allele and genotype frequencies will change in populations. EVO-1.L: Explain the impacts on the population if any of the conditions of Hardy-Weinberg are not met.	Topic Questions

Week 10: Mar. 8–12

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
7.6	Evidence of Evolution	AP Daily Video 1	EVO-1.M: Describe the types of data that provide evidence for evolution. EVO-1.N: Explain how morphological, biochemical, and geological data provide evidence that organisms have changed over time. EVO-2.B: Describe the fundamental molecular and cellular features shared across all domains of life, which provide evidence of common ancestry.	Topic Questions

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
7.7	Common Ancestry	AP Daily Video 1	EVO-2.C: Describe structural and functional evidence on cellular and molecular levels that provides evidence for the common ancestry of all eukaryotes.	Topic Questions
7.8	Continuing Evolution	AP Daily Video 1	EVO-3.A: Explain how evolution is an ongoing process in all living organisms.	Topic Questions

Week 11: Mar. 15–19

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
7.9	Phylogeny	AP Daily Video 1	EVO-3.B: Describe the types of evidence that can be used to infer an evolutionary relationship. EVO-3.C: Explain how a phylogenetic tree and/or cladogram can be used to infer evolutionary relatedness.	Topic Questions
7.10	Speciation	AP Daily Video 1	EVO-3.D: Describe the conditions under which new species may arise. EVO-3.E: Describe the rate of evolution and speciation under different ecological conditions. EVO-3.F: Explain the processes and mechanisms that drive speciation.	Topic Questions
7.11	Extinction	AP Daily Video 1	EVO-3.G: Describe factors that lead to the extinction of a population. EVO-3.H: Explain how the risk of extinction is affected by changes in the environment. EVO-3.I: Explain species diversity in an ecosystem as a function of speciation and extinction rates. EVO-3.J: Explain how extinction can make new environments available for adaptive radiation.	Topic Questions

Week 12: Mar. 22–26

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
7.12	Variations in Populations	AP Daily Video 1	SYI-3.D: Explain how the genetic diversity of a species or population affects its ability to withstand environmental pressures.	Topic Questions
7.13	Origin of Life on Earth	AP Daily Video 1	SYI-3.E: Describe the scientific evidence that provides support for models of the origin of life on Earth.	Topic Questions Personal Progress Check
8.1	Responses to the Environment	AP Daily Video 1	ENE-3.D: Explain how the behavioral and/or physiological response of an organism is related to changes in internal or external environment. IST-5.A: Explain how the behavioral responses of organisms affect their overall fitness and may contribute to the success of the population.	Topic Questions

Week 13: Mar. 29–Apr. 2

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
8.2	Energy Flow Through Ecosystems	AP Daily Video 1	ENE-1.M: Describe the strategies organisms use to acquire and use energy. ENE-1.N: Explain how changes in energy availability affect populations and ecosystems. ENE-1.O: Explain how the activities of autotrophs and heterotrophs enable the flow of energy within an ecosystem.	Topic Questions
8.3	Population Ecology	AP Daily Video 1	SYI-1.G: Describe factors that influence growth dynamics of populations.	Topic Questions
8.4	Effect of Density of Populations	AP Daily Video 1	SYI-1.H: Explain how the density of a population affects and is determined by resource availability in the environment.	Topic Questions

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
8.5	Community Ecology	AP Daily Video 1	ENE-4.A: Describe the structure of a community according to its species composition and diversity. ENE-4.B: Explain how interactions within and among populations influence community structure. ENE-4.C: Explain how community structure is related to energy availability in the environment.	Topic Questions

Week 14: Apr. 5–9

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
8.6	Biodiversity	AP Daily Video 1	SYI-3.F: Describe the relationship between ecosystem diversity and its resilience to changes in the environment. SYI-3.G: Explain how the addition or removal of any component of an ecosystem will affect its overall short-term and long-term structure.	Topic Questions

Week 15: Apr. 12–16

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
8.7	Disruptions to Ecosystems	AP Daily Video 1	EVO-1.O: Explain the interaction between the environment and random or preexisting variations in populations. SYI-2.A: Explain how invasive species affect ecosystem dynamics. SYI-2.B: Describe human activities that lead to changes in ecosystem structure and/or dynamics. SYI-2.C: Explain how geological and meteorological activity leads to changes in ecosystem structure and/or dynamics.	Topic Questions Personal Progress Check