Course at a Glance

Plan

The course at a glance provides a useful visual organization of the AP Biology curricular components, including:

- Sequence of units, along with approximate weighting and suggested pacing. Please note, pacing is based on 45-minute class periods, meeting five days each week for a full academic year
- Progression of topics within each unit
- Spiraling of the big ideas and science practices across units

Teach

SCIENCE PRACTICES

Science practices are spiralled throughout the course:

1 Concept Explanation
2 Visual Representations
3 Questions and Methods
4 Representing and Describing Data
5 Statistical Tests and Data Analysis
6 Argumentation

BIG IDEAS

The big ideas spiral across topics and units:

EVO Evolution
IST Information Storage and Transfer
ENE Energetics
SYI Systems Interactions

Assess

Assign the Personal Progress Checks—either as homework or in class—for each unit. Each Personal Progress Check contains formative multiple-choice and free-response questions. The feedback from the Personal Progress Checks shows students the areas where they need to focus.

UNIT 1 Chemistry of Life

~5-7 Class Periods | **8-11%** AP Exam Weighting

SYI 2	1.1 Structure of Water and Hydrogen Bonding
ENE 2	1.2 Elements of Life
SYI 2	1.3 Introduction to Biological Macromolecules
SYI 1	1.4 Properties of Biological Macromolecules
SYI 6	1.5 Structure and Function of Biological Macromolecules
IST 2	1.6 Nucleic Acids

Personal Progress Check 1

Multiple-Choice: ~20 questions
Free-Response: 2 questions

- Conceptual Analysis (partial)
- Analyze Model or Visual Representation (partial)

UNIT 2 Cell Structure and Function

~11-13 Class Periods | **10-13%** AP Exam Weighting

SYI 1	2.1 Cell Structure: Subcellular Components
SYI 6	2.2 Cell Structure and Function
ENE 5 2	2.3 Cell Size
ENE 2	2.4 Plasma Membranes
ENE 3	2.5 Membrane Permeability
ENE 3	2.6 Membrane Transport
ENE 6	2.7 Facilitated Diffusion
ENE 4	2.8 Tonicity and Osmoregulation
ENE 1	2.9 Mechanisms of Transport
ENE 6	2.10 Cell Compartmentalization
EVO 6	2.11 Origins of Cell Compartmentalization

Personal Progress Check 2

Multiple-Choice: ~30 questions
Free-Response: 2 questions

- Interpreting and Evaluating Experimental Results (partial)
- Analyze Model or Visual Representation (partial)

NOTE: Partial versions of the free-response questions are provided to prepare students for more complex, full questions that they will encounter on the AP Exam.

UNIT 3 Cellular Energetics

~14-17 Class Periods | **12-16%** AP Exam Weighting

ENE 1	3.1 Enzyme Structure
ENE 3	3.2 Enzyme Catalysis
ENE 6	3.3 Environmental Impacts on Enzyme Function
ENE 6	3.4 Cellular Energy
ENE 6	3.5 Photosynthesis
ENE 4	3.6 Cellular Respiration
SYI 6	3.7 Fitness

Personal Progress Check 3

Multiple-Choice: ~20 questions
Free-Response: 2 questions

- Interpreting and Evaluating Experimental Results with Graphing (partial)
- Scientific Investigation (partial)

UNIT 4 Cell Communication and Cell Cycle

~9-11 Class Periods | **10-15%** AP Exam Weighting

IST 1	4.1 Cell Communication
IST 1	4.2 Introduction to Signal Transduction
IST 6	4.3 Signal Transduction
IST 6	4.4 Changes in Signal Transduction Pathways
ENE 6	4.5 Feedback
IST 4 5	4.6 Cell Cycle
IST 6	4.7 Regulation of Cell Cycle

Personal Progress Check 4

Multiple-Choice: ~25 questions
Free-Response: 2 questions

- Interpreting and Evaluating Experimental Results (partial)
- Analyze Data

UNIT 5 Heredity

~9-11 Class Periods | **8-11%** AP Exam Weighting

IST 1	5.1 Meiosis
IST 3	5.2 Meiosis and Genetic Diversity
EVO IST 6 5	5.3 Mendelian Genetics
IST 5	5.4 Non-Mendelian Genetics
SYI 1	5.5 Environmental Effects on Phenotype
SYI 6	5.6 Chromosomal Inheritance

Personal Progress Check 5

Multiple-Choice: ~25 questions
Free-Response: 2 questions

- Interpreting and Evaluating Experimental Results with Graphing
- Conceptual Analysis

NOTE: Partial versions of the free-response questions are provided to prepare students for more complex, full questions that they will encounter on the AP Exam.

UNIT 6 Gene Expression and Regulation

~18-21 Class Periods | 12-16% AP Exam Weighting

- IST 1 — 6.1 DNA and RNA Structure
- IST 2 — 6.2 Replication
- IST 2 — 6.3 Transcription and RNA Processing
- IST 6 2 — 6.4 Translation
- IST 6 — 6.5 Regulation of Gene Expression
- IST 6 — 6.6 Gene Expression and Cell Specialization
- IST 2 3 — 6.7 Mutations
- IST 6 — 6.8 Biotechnology

Personal Progress Check 6

Multiple-Choice: ~25 questions
Free-Response: 2 questions

- Interpreting and Evaluating Experimental Results
- Analyze Model or Visual Representation

UNIT 7 Natural Selection

~20-23 Class Periods | 13-20% AP Exam Weighting

- EVO 2 — 7.1 Introduction to Natural Selection
- EVO 1 — 7.2 Natural Selection
- EVO 4 — 7.3 Artificial Selection
- EVO 3 — 7.4 Population Genetics
- EVO 5 1 — 7.5 Hardy-Weinberg Equilibrium
- EVO 4 — 7.6 Evidence of Evolution
- EVO 6 — 7.7 Common Ancestry
- EVO 3 — 7.8 Continuing Evolution
- EVO 2 — 7.9 Phylogeny
- EVO 6 2 — 7.10 Speciation
- EVO 3 — 7.11 Extinction
- SYI 6 — 7.12 Variations in Populations
- SYI 3 — 7.13 Origin of Life on Earth

Personal Progress Check 7

Multiple-Choice: ~40 questions
Free-Response: 2 questions

- Interpreting and Evaluating Experimental Results with Graphing
- Analyze Data

UNIT 8 Ecology

~18-21 Class Periods | 10-15% AP Exam Weighting

- ENE IST 3 — 8.1 Responses to the Environment
- ENE 6 — 8.2 Energy Flow Through Ecosystems
- SYI 4 — 8.3 Population Ecology
- SYI 5 — 8.4 Effect of Density of Populations
- ENE 5 — 8.5 Community Ecology
- SYI 6 — 8.6 Biodiversity
- EVO SYI 5 — 8.7 Disruptions to Ecosystems

Personal Progress Check 8

Multiple-Choice: ~20 questions
Free-Response: 2 questions

- Interpreting and Evaluating Experimental Results with Graphing
- Scientific Investigation

UNIT AT A GLANCE

Enduring Understanding	Topic	Suggested Skill	Class Periods ~5–7 CLASS PERIODS
SYI-1	**1.1 Structure of Water and Hydrogen Bonding**	2.A Describe characteristics of a biological concept, process, or model represented visually.	
ENE-1	**1.2 Elements of Life**	2.A Describe characteristics of a biological concept, process, or model represented visually.	
SYI-1	**1.3 Introduction to Biological Macromolecules**	2.A Describe characteristics of a biological concept, process, or model represented visually.	
	1.4 Properties of Biological Macromolecules	1.A Describe biological concepts and/or processes.	
	1.5 Structure and Function of Biological Macromolecules	6.E.b Predict the causes or effects of a change in, or disruption to, one or more components in a biological system based on a visual representation of a biological concept, process, or model.	
IST-1	**1.6 Nucleic Acids**	2.A Describe characteristics of a biological concept, process, or model represented visually.	

Go to **AP Classroom** to assign the **Personal Progress Check** for Unit 1. Review the results in class to identify and address any student misunderstandings.

UNIT AT A GLANCE

Enduring Understanding	Topic	Suggested Skill	Class Periods ~11–13 CLASS PERIODS
SYI-1	**2.1 Cell Structure: Subcellular Components**	1.A Describe biological concepts and/or processes.	
	2.2 Cell Structure and Function	6.A Make a scientific claim.	
ENE-1	**2.3 Cell Size**	2.D.a Represent relationships within biological models, including mathematical models. 5.A.d Perform mathematical calculations, including ratios.	
ENE-2	**2.4 Plasma Membranes**	2.A Describe characteristics of a biological concept, process, or model represented visually.	
	2.5 Membrane Permeability	3.D Make observations or collect data from representations of laboratory setups or results. 5.D.b Use data to evaluate a hypothesis (or prediction), including supporting or refuting the alternative hypothesis.	
	2.6 Membrane Transport	3.E.b Propose a new/next investigation based on an evaluation of the design/methods.	
	2.7 Facilitated Diffusion	6.E.b Predict the causes or effects of a change in, or disruption to, one or more components in a biological system based on a visual representation of a biological concept, process, or model.	
	2.8 Tonicity and Osmoregulation	4.A Construct a graph, plot, or chart.	
	2.9 Mechanisms of Transport	1.B Explain biological concepts and/or processes.	
	2.10 Cell Compartmentalization	6.E.a Predict the causes or effects of a change in, or disruption to, one or more components in a biological system based on a biological concepts or processes.	
EVO-1	**2.11 Origins of Cell Compartmentalization**	6.B Support a claim with evidence from biological principles, concepts, processes, and/or data.	

Go to **AP Classroom** to assign the **Personal Progress Check** for Unit 2. Review the results in class to identify and address any student misunderstandings.

UNIT AT A GLANCE

Enduring Understanding	Topic	Suggested Skill	Class Periods ~14–17 CLASS PERIODS
ENE-1	**3.1 Enzyme Structure**	1.B Explain biological concepts and/or processes.	
	3.2 Enzyme Catalysis	3.C.b Identify experimental procedures that are aligned to the question, including identifying appropriate controls. 3.C.c Identify experimental procedures that are aligned to the question, including justifying appropriate controls.	
	3.3 Environmental Impacts on Enzyme Function	6.E.c Predict the causes or effects of a change in, or disruption to, one or more components in a biological system based on data.	
	3.4 Cellular Energy	6.C Provide reasoning to justify a claim by connecting evidence to biological theories.	
	3.5 Photosynthesis	6.B Support a claim with evidence from biological principles, concepts, processes, and/or data.	
	3.6 Cellular Respiration	4.A Construct a graph, plot, or chart.	
SYI-3	**3.7 Fitness**	6.C Provide reasoning to justify a claim by connecting evidence to biological theories.	

Go to **AP Classroom** to assign the **Personal Progress Check** for Unit 3. Review the results in class to identify and address any student misunderstandings.

UNIT AT A GLANCE

Enduring Understanding	Topic	Suggested Skill	Class Periods
			~9–11 CLASS PERIODS
IST-3	**4.1 Cell Communication**	1.B Explain biological concepts and/or processes.	
	4.2 Introduction to Signal Transduction	1.A Describe biological concepts and/or processes.	
	4.3 Signal Transduction	6.C Provide reasoning to justify a claim by connecting evidence to biological theories.	
	4.4 Changes in Signal Transduction Pathways	6.E.b Predict the causes or effects of a change in, or disruption to, one or more components in a biological system based on a visual representation of a biological concept, process, or model.	
ENE-3	**4.5 Feedback**	6.E.b Predict the causes or effects of a change in, or disruption to, one or more components in a biological system based on a visual representation of a biological concept, process, or model.	
IST-1	**4.6 Cell Cycle**	4.B.b Describe data from a table or graph, including describing trends and/or patterns in the data. 5.A.e Perform mathematical calculations, including percentages.	
	4.7 Regulation of Cell Cycle	6.E.a Predict the causes or effects of a change in, or disruption to, one or more components in a biological system based on biological concepts or processes.	

Go to **AP Classroom** to assign the **Personal Progress Check** for Unit 4. Review the results in class to identify and address any student misunderstandings.

UNIT AT A GLANCE

Enduring Understanding	Topic	Suggested Skill	Class Periods ~9–11 CLASS PERIODS
IST-1	**5.1 Meiosis**	1.B Explain biological concepts and/or processes.	
IST-1	**5.2 Meiosis and Genetic Diversity**	3.A Identify or pose a testable question based on an observation, data, or a model.	
EVO-2, IST-1	**5.3 Mendelian Genetics**	5.C Perform chi-square hypothesis testing. 6.E.c Predict the causes or effects of a change in, or disruption to, one or more components in a biological system based on data.	
IST-1	**5.4 Non-Mendelian Genetics**	5.A.b Perform mathematical calculations, including means. 5.C Perform chi-square hypothesis testing.	
SYI-3	**5.5 Environmental Effects on Phenotype**	1.C Explain biological concepts, processes, and/or models in applied contexts.	
SYI-3	**5.6 Chromosomal Inheritance**	6.E.b Predict the causes or effects of a change in, or disruption to, one or more components in a biological system based on a visual representation of a biological concept, process, or model.	

Go to **AP Classroom** to assign the **Personal Progress Check** for Unit 5.
Review the results in class to identify and address any student misunderstandings.

UNIT AT A GLANCE

Enduring Understanding	Topic	Suggested Skill	Class Periods ~18–21 CLASS PERIODS
IST-1	**6.1 DNA and RNA Structure**	1.C Explain biological concepts, processes, and/or models in applied contexts.	
	6.2 Replication	2.B.b Explain relationships between different characteristics of biological concepts, processes, or models represented visually in applied contexts.	
	6.3 Transcription and RNA Processing	2.B.b Explain relationships between different characteristics of biological concepts, processes, or models represented visually in applied contexts.	
	6.4 Translation	2.D.b Represent relationships within biological models, including diagrams. 6.E.a Predict the causes or effects of a change in, or disruption to, one or more components in a biological system based on biological concepts.	
IST-2	**6.5 Regulation of Gene Expression**	6.A Make a scientific claim.	
	6.6 Gene Expression and Cell Specialization	6.B Support a claim with evidence from biological principles, concepts, processes, and/or data.	
IST-2, IST-4	**6.7 Mutations**	2.C Explain how biological concepts or processes represented visually relate to larger biological principles, concepts, processes, or theories. 3.D Make observations or collect data from representations of laboratory setups or results.	
IST-1	**6.8 Biotechnology**	6.D Explain the relationship between experimental results and larger biological concepts, processes, or theories.	
	Go to **AP Classroom** to assign the **Personal Progress Check** for Unit 6. Review the results in class to identify and address any student misunderstandings.		

UNIT AT A GLANCE

Enduring Understanding	Topic	Suggested Skill	Class Periods ~20–23 CLASS PERIODS
EVO-1	**7.1 Introduction to Natural Selection**	2.A Describe characteristics of a biological concept, process, or model represented visually.	
	7.2 Natural Selection	1.B Explain biological concepts and/or processes.	
	7.3 Artificial Selection	4.B.c Describe data from a table or graph, including describing relationships between variables.	
	7.4 Population Genetics	3.B State the null or alternative hypotheses, or predict the results of an experiment.	
	7.5 Hardy-Weinberg Equilibrium	5.A.a Perform mathematical calculations, including mathematical equations in the curriculum. 1.C Explain biological concepts, processes, and/or models in applied contexts.	
EVO-1 EVO-2	**7.6 Evidence of Evolution**	4.B.a Describe data from a table or graph, including identifying specific data points.	
EVO-2	**7.7 Common Ancestry**	6.E.b Predict the causes or effects of a change in, or disruption to, one or more components in a biological system based on a visual representation of a biological concept, process, or model.	

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UNIT AT A GLANCE *(cont'd)*

Enduring Understanding	Topic	Suggested Skill	Class Periods ~20–23 CLASS PERIODS
EVO-3	**7.8 Continuing Evolution**	3.E.a Propose a new/next investigation based on an evaluation of the evidence from an experiment.	
	7.9 Phylogeny	2.D.c Represent relationships within biological models, including flowcharts.	
	7.10 Speciation	6.E.a Predict the causes or effects of a change in, or disruption to, one or more components in a biological system based on biological concepts or processes. 2.B.a Explain relationships between different characteristics of biological concepts, processes, or models represented visually in theoretical contexts.	
	7.11 Extinction	3.B State the null or alternative hypotheses, or predict the results of an experiment.	
SYI-3	**7.12 Variations in Populations**	6.C Provide reasoning to justify a claim by connecting evidence to biological theories.	
	7.13 Origin of Life on Earth	3.B State the null or alternative hypotheses, or predict the results of an experiment.	
	Go to **AP Classroom** to assign the **Personal Progress Check** for Unit 7. Review the results in class to identify and address any student misunderstandings.		

UNIT AT A GLANCE

Enduring Understanding	Topic	Suggested Skill	Class Periods ~18–21 CLASS PERIODS
ENE-3, IST-5	**8.1 Responses to the Environment**	3.C.a Identify experimental procedures that are aligned to the question, including identifying dependent and independent variables.	
ENE-1	**8.2 Energy Flow Through Ecosystems**	6.D Explain the relationship between experimental results and larger biological concepts, processes, or theories.	
SYI-1	**8.3 Population Ecology**	4.A Construct a graph, plot, or chart.	
	8.4 Effect of Density of Populations	5.A.c Perform mathematical calculations, including rates.	
ENE-4	**8.5 Community Ecology**	5.B Use confidence intervals and/or error bars (both determined using standard errors) to determine whether sample means are statistically different.	
SYI-3	**8.6 Biodiversity**	6.E.c Predict the causes or effects of a change in, or disruption to, one or more components in a biological system based on data.	
EVO-1, SYI-2	**8.7 Disruptions to Ecosystems**	5.D.a Use data to evaluate a hypothesis (or prediction), including rejecting or failing to reject the null hypothesis. 5.D.b Use data to evaluate a hypothesis (or prediction), including supporting or refuting the alternative hypothesis.	
	Go to **AP Classroom** to assign the **Personal Progress Check** for Unit 8. Review the results in class to identify and address any student misunderstandings.		

Exam Overview

The AP Biology Exam assesses student understanding of the science practices and learning objectives outlined in the course framework. The exam is 3 hours long and includes 60 multiple-choice questions and 6 free-response questions. A four-function, scientific, or graphing calculator is allowed on both sections of the exam. The details of the exam, including exam weighting and timing, can be found below:

Section	Question Type	Number of Questions	Exam Weighting	Timing
I	**Multiple-choice questions**	**60**	**50%**	**90 minutes**
II	**Free-response questions**	**6**	**50%**	**90 minutes**
	Question 1: Interpreting and Evaluating Experimental Results (8–10 pts)			
	Question 2: Interpreting and Evaluating Experimental Results with Graphing (8–10 pts)			
	Question 3: Scientific Investigation (4 pts)			
	Question 4: Conceptual Analysis (4 pts)			
	Question 5: Analyze Model or Visual Representation (4 pts)			
	Question 6: Analyze Data (4 pts)			

The exam assesses content from each of four big ideas for the course:
1. Evolution
2. Energetics
3. Information Storage and Transmission
4. Systems Interactions

The exam also assesses each of the eight units of the course with the following exam weightings on the multiple-choice section of the AP Exam:

Unit	Exam Weighting
1: Chemistry of Life	**8–11%**
2: Cell Structure and Function	**10–13%**
3: Cellular Energetics	**12–16%**
4: Cell Communication and Cell Cycle	**10–15%**
5: Heredity	**8–11%**
6: Gene Expression and Regulation	**12–16%**
7: Natural Selection	**13–20%**
8: Ecology	**10–15%**