Curricular Requirements	Page(s)
CR1 Students and teachers use a recently published (within the last 10 years) college-level biology textbook.	2
CR2 The course is structured around the enduring understandings within the big ideas as described in the AP® Biology Curriculum Framework.	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
CR3a Students connect the enduring understandings within Big Idea 1 (the process of evolution drives the diversity and unity of life) to at least one other big idea.	4, 9, 11
CR3b Students connect the enduring understandings within Big Idea 2 (biological systems utilize free energy and molecular building blocks to grow, to reproduce, and to maintain dynamic homeostasis) to at least one other big idea.	4, 5, 6, 8, 9, 11, 12
CR3c Students connect the enduring understandings within Big Idea 3 (living systems store, retrieve, transmit, and respond to information essential to life processes) to at least one other big idea.	4, 6, 7, 8, 9, 11
CR3d Students connect the enduring understandings within Big Idea 4 (biological systems interact and these systems and their interactions possess complex properties) to at least one other big idea.	4, 5, 7, 8, 9, 11
CR4a The course provides students with opportunities outside of the laboratory investigations to meet the learning objectives within Big Idea 1	4, 6, 9, 11
CR4b The course provides students with opportunities outside of the laboratory investigations to meet the learning objectives within Big Idea 2.	4, 5, 6, 8, 9, 11, 12
CR4c The course provides students with opportunities outside of the laboratory investigations to meet the learning objectives within Big Idea 3.	4, 6, 7, 8, 9, 11
CR4d The course provides students with opportunities outside of the laboratory investigations to meet the learning objectives within Big Idea 4.	4, 5, 7, 8, 9, 11
CR5 The course provides students with opportunities to connect their biological and scientific knowledge to major social issues (e.g., concerns, technological advances, innovations) to help them become scientifically literate citizens.	3, 4, 6, 8, 10, 11, 12
CR6 The student-directed laboratory investigations used throughout the course allow students to apply the seven science practices defined in the AP Biology Curriculum Framework and include at least two lab experiences in each of the four big ideas.	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
CR7 Students are provided the opportunity to engage in investigative laboratory work integrated throughout the course for a minimum of 25 percent of instructional time.	3
CR8 The course provides opportunities for students to develop and record evidence of their verbal, written and graphic communication skills through laboratory reports, summaries of literature or scientific investigations, and oral, written, or graphic presentations.	3, 4, 5, 6, 7, 8, 9, 10, 11, 12

Course Overview

Advanced Placement Biology is part of a nationwide program based on the belief that many students are ready for college work while still in high school, and their abilities should be recognized, encouraged and rewarded. As a college level course, the amount of material covered as well as the complexity of the topics will be high. It is the responsibility of the student to come to class each day understanding the previous day's material. An ongoing unstated assignment, therefore, is to learn the material as it is presented. Students must be certain that they are willing to accept this challenge and be committed to keep up with the work.

Instructional Context

The course will meet for 90 minutes per day, every other week, for approximately 86 school days total. Students must have completed Biology and Chemistry prior to enrolling in AP Biology. In some cases students may be enrolled in Chemistry concurrently with AP Biology. The course will be delivered using a hybrid model, with students using an online course to organize resources, discuss relevant topics, and maintain communication with both the instructor and classmates, and to complete assignments during the 'off' week.

The course is structured around the 4 Big Ideas and the Enduring Understandings identified in the Curriculum Framework. All learning objectives will be addressed through this curriculum. The course will focus on inquiry-based laboratory work and will incorporate the 7 Science Practices in lab activities, which will take a minimum of 25% of instructional time.

The 4 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.

Students will be given a copy of the Curriculum Framework, along with the Science Practices, to track their progress in the course, and will create a web of connectedness across Enduring Understandings from the 4 Big Ideas.

Textbooks/Resources
Reece, Jane et al., *Campbell Biology*, 9th Edition. Benjamin Cummings, 2011. [CR 1]
AP Biology Investigative Labs: An Inquiry-Based Approach, The College Board, 2012
Online course created by instructor in moodle
PBS Nova: "Judgement Day: Intelligent Design on Trial"
PBS Nova: "What Darwin Never Knew"

Book Club options:

Stiff: The Curious Lives of Human Cadavers - Mary Roach
The Seven Daughters of Eve: The Science That Reveals Our Genetic Ancestry - Bryan Sykes
The Immortal Life of Henrietta Lacks: Rebecca Skloot
Your Inner Fish: A Journey into the 3.5 Billion Year History of the Human Body - Neil Shubin
Why Evolution is True - Jerry A. Coyne

Class discussions may be based on animations from various sources (textbook, CDs, Internet, etc.) to help the students visualize what they have read. Quizzes are interspersed throughout the unit and inform how instruction may need to be adjusted to improve student learning. Online practice quizzes, administered through moodle can help students evaluate their progress. Lectures may be provided online in some cases, units may be "flipped" so that more class time can be devoted to laboratory and discussion.

The two main goals of AP Biology are to help students develop a conceptual framework for modern biology and to help students gain an appreciation of science as a process. The ongoing information explosion in biology makes these goals even more challenging. Students are encouraged to focus on understanding important relationships, processes, mechanisms, and potential extensions and applications of concepts. The course provides opportunities to connect scientific knowledge to major social issues to help students become scientifically literate citizens. [CR 5]

Technology is used extensively throughout the course, and students are required to participate in asynchronous discussions and develop other educational artifacts such as concept maps, multimedia presentations, or webpages that illustrate their understanding of topics. [CR 8]

Hands-on labs will constitute at least 25% of instructional time [CR 7]. Students will have the opportunity to complete at least two lab experiences in each of the four big ideas. [CR 6] Many of these labs are inquiry based, and emphasize collaboration, development of hypotheses, data collection, analysis and presentation. Students will maintain a laboratory notebook that documents their investigations throughout the year. [CR 8]

Science Practices {SP} * see page 13 for list of student directed labs and practices addressed

1. The student can use representations and models to communicate scientific phenomena and solve scientific problems.
2. The student can use mathematics appropriately.
3. The student can engage in scientific questioning to extend thinking or to guide investigations within the context of the AP course.
4. The student can plan and implement data collection strategies appropriate to a particular scientific question.
5. The student can perform data analysis and evaluation of evidence.
6. The student can work with scientific explanations and theories.
7. The student is able to connect and relate knowledge across various scales, concepts and representations in and across domains.

Social and Ethical Concerns

The course will allow students to learn about and discuss many current social and ethical issues in Biology. Both in-class and online discussion of these topics will take place throughout the course. Some example topics include stem cell research, ethical use of genetic information, and environmental concerns. Investigative cases will be incorporated throughout the course to bring more topics into focus. In addition, our book club options will be discussed throughout the course.[CR 5]

COURSE SCHEDULE

<table>
<tr><td>Unit 1: Chemistry of Life ~2weeks</td><td>Campbell Chapters: 3, 4, 5</td></tr>
<tr><td>Topics:</td><td>Curriculum Framework:</td></tr>
<tr><td rowspan="2">• Scientific method and experimental design
• Practice with data collection, analysis, and presentation
• Identify basic elements of living organisms
• Describe water's unique properties
• Describe the structure of organic compounds
• Understand the pH scale, redox reactions, and hydrolysis/condensation
• Apply the laws of thermodynamics to biological systems
• Investigate enzyme structure and function</td><td>Big Idea 1, 2, 3, 4</td></tr>
<tr><td>Enduring Understanding:

1.D
2.A
3.A
4.A
4.C</td></tr>
<tr><td>Activities:</td><td>Essential Knowledge:</td></tr>
<tr><td>• Chapter readings and Reading Guides
• Design an experiment, create and revise hypotheses, organize data, present findings {SP}
• Lead class discussion on experimental design by explaining the design process and identifying controls and variables {SP}
• Setting Up and Maintaining Proper Lab Notebooks
• Got Protein?™ inquiry-based biophotonics lab to analyze and compare protein content in biologically derived material [CR4d]
• Participate in asynchronous discussion where students respond to a prompt concerning an environmental issue [CR 5]</td><td>1.D.1
2.A.3
3.A.1
4.A.1
4.C.1</td></tr>
<tr><td>Assessment:</td><td>Learning Objectives/Science Practices</td></tr>
<tr><td>• Water Quiz
• Carbon Quiz
• Organic Compounds Quiz
• Got Protein Lab Notebook Evaluation
• Unit Exam (MC and essay)</td><td>LO
1.27, 1.28, 1.29, 1.30, 1.31, 2.6, 2.7, 2.8, 2.9, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 4.1, 4.2, 4.3, 4.22

SP
1.1, 1.2, 1.3, 1.4, 2.2, 3.3, 4.1, 4.4, 6.1, 6.2, 6.3, 6.4, 6.5, 7.1</td></tr>
</table>

<table>
<tr><td>Unit 2: Cell Biology ~5 weeks</td><td>Campbell Chapters: 6, 7, 8, 9, 10</td></tr>
<tr><td>Topics:</td><td>Curriculum Framework:</td></tr>
<tr><td rowspan="2">Compare and contrast prokaryotic and eukaryotic cells
Structure and function of organelles common to plant and animal cells
Structure and function of organelles found only in plant cells or only in animal cells
Selective Permeability
The role of Phospholipids, proteins, and carbohydrates in membranes
Isotonic, hypertonic, and hypotonic solutions and their effects on cells
Electrochemical gradients and what they mean in a cell
Endergonic and exergonic reactions
Catalytic cycle of an enzyme and factors that influence enzyme activity
Cellular Respiration
Photosynthesis
Writing Lab Reports</td><td>Big Idea 2, 4</td></tr>
<tr><td>Enduring Understanding:

2.A
2.B
4.A
4.B</td></tr>
<tr><td>Activities:</td><td>Essential Knowledge:</td></tr>
<tr><td>Chapter readings and Reading Guides
Create cell models [CR4B]
Cellular Respiration Lab [CR 6]
also connects Big Idea 2 to Big Idea 4 [CR3B] and [CR3D]
Photosynthesis Lab [CR 6]
Case Study: Bean Brew</td><td>2.A.1
2.A.2
2.A.3
2.B.1
2.B.2
2.B.3
4.A.2
4.B.1
4.B.2</td></tr>
<tr><td>Assessment:</td><td>Learning Objectives/Science Practices</td></tr>
<tr><td>Cell Structure Quiz
Enzyme Quiz
Cellular Respiration Lab Notebook Evaluation
Photosynthesis Lab Report
Photosynthesis & Cellular Respiration Quiz
Written Analysis of Case Study
Unit Exam (MC and FRQ)</td><td>LO
2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10, 2.11, 2.12, 2.13, 2.14, 4.4, 4.5, 4.6, 4.17, 4.18

SP
1.1, 1.4, 2.2, 3.1, 4.1, 5.1, 6.1, 6.2, 6.4, 7.1, 7.2</td></tr>
</table>

<table>
<tr><td>Unit 3: Cellular Communication & Reproduction ~1-2 weeks</td><td>Campbell Chapters: 11, 12</td></tr>
<tr><td>Topics:</td><td>Curriculum Framework:</td></tr>
<tr><td rowspan="2">• Three stages of cell communication: reception, transduction, and response
• How a cell response can turn on genes
• Apoptosis
• Chromosome structure
• Cell Cycle and stages of Mitosis
• Regulation of the Cell Cycle
• Role of mitosis in distribution of genetic information</td><td>Big Idea 2, 3

Enduring Understanding:

2.E
3.A
3.B
3.D</td></tr>
<tr><td>Activities:</td><td>Essential Knowledge:</td></tr>
<tr><td>• Chapter readings and Reading Guides
• Cellular Communications Group Project
• Watch “Judgment Day: Intelligent Design on Trial”, summarize the judge’s reasoning in the outcome of the case [CR8] and [CR4a] and [CR5]
• Class Debate
• AP Lab 7: Cell Division: Mitosis & Meiosis, Part 2 – Effects of Environment on Mitosis, Part 3 – Loss of Cell Cycle Control in Cancer
• Pathways with Friends: <http://learn.genetics.utah.edu> Directed by instructional cards, students kinesthetically model cell communication by acting as components in a cell signaling. Whole class discussion follows, assessing student understanding of cell communication. [CR4c]</td><td>2.E.2
3.A.2
3.B.2
3.D.1
3.D.2
3.D.3
3.D.4</td></tr>
<tr><td>Assessment:</td><td>Learning Objectives/Science Practices</td></tr>
<tr><td>• Cellular Communication Quiz
• Debate Evaluation
• Lab Notebook Evaluation
• Unit Exam(MC and FRQ)</td><td>LO
2.35, 2.36, 2.37, 3.7, 3.8, 3.9, 3.10, 3.11, 3.22, 3.23, 3.31, 3.32, 3.33, 3.34, 3.35, 3.36, 3.37, 3.38, 3.39

SP
1.1, 1.2, 1.4, 1.5, 3.1, 4.2, 5.3, 6.1, 6.2, 6.4, 7.1, 7.2,</td></tr>
</table>

<table>
<tr><td>Unit 4: Mendelian Genetics ~3 weeks</td><td>Campbell Chapters: 13, 14, 15</td></tr>
<tr><td>Topics:</td><td>Curriculum Framework:</td></tr>
<tr><td rowspan="2">Asexual vs. Sexual Reproduction
Meiosis and Fertilization
Importance of crossing over, independent assortment, and random fertilization in genetic variability
Solving genetics problems using Punnett Squares
Pedigree analysis
Complex patterns of inheritance</td><td>Big Idea 3, 4

Enduring Understanding:</td></tr>
<tr><td>3.A
3.C
4.C</td></tr>
<tr><td>Activities:</td><td>Essential Knowledge:</td></tr>
<tr><td>Chapter readings and Reading Guides
AP Lab 7: Cell Division: Mitosis & Meiosis, Part 4 – Modeling Meiosis, Part 5 – Meiosis and Crossing over in Sordaria
Genetics Problem Set
Chi-Square Analysis: Corn Genetics</td><td>3.A.2
3.A.3
3.A.4
3.C.1
3.C.2
4.C.2
4.C.4</td></tr>
<tr><td>Assessment:</td><td>Learning Objectives/Science Practices</td></tr>
<tr><td>Poster Presentations of Meiosis Lab
Genetics Problem Set
Meiosis Quiz
Inheritance Quiz
Unit Exam (MC and FRQ)</td><td>LO
3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14, 3.15, 3.16, 3.17, 3.24, 3.25, 3.26, 3.27, 3.28, 4.23, 4.24, 4.27

SP
1.1, 1.2, 2.2, 3.1, 5.3, 6.2, 6.3, 6.4, 6.5, 7.1, 7.2,</td></tr>
</table>

<table>
<tr><td>Unit 5: Molecular Genetics ~3 weeks</td><td>Campbell Chapters: 16, 17, 18, 19, 20, 21</td></tr>
<tr><td>Topics:</td><td>Curriculum Framework:</td></tr>
<tr><td rowspan="2">DNA Structure as determined by Watson, Crick, Wilkins, Franklin, Avery, MacLeod, McCarty, Hershey, Chase
Replication, Transcription, and Translation
Operons and gene regulation
Viruses
Biotechnology: Cloning, PCR, Electrophoresis
Genomes</td><td>Big Idea 2, 3, 4

Enduring Understanding:</td></tr>
<tr><td>2.E
3.A
3.B
3.C
4.A
4.C</td></tr>
<tr><td>Activities:</td><td>Essential Knowledge:</td></tr>
<tr><td>Chapter readings and Reading Guides
AP Lab 3: Comparing DNA Sequences to Understand Evolutionary Relationships with BLAST
Lab: Cloning of a PCR Amplified Gene (Bacterial Transformation and Electrophoresis)
Case Study: Shh: Silencing the Hedgehog Pathway, or The Donor’s Dilemma, or Tree Thinking, or Pandemic Flu [CR5]</td><td>2.E.1
3.A.1
3.B.1
3.B.2
3.C.1
3.C.3
4.A.3
4.C.1</td></tr>
<tr><td>Assessment:</td><td>Learning Objectives/Science Practices</td></tr>
<tr><td>Lab Notebook Evaluation
Lab Report – Cloning of a PCR Amplified Gene
Discussion Assessment
Written Analysis of Case Study
Unit Exam (MC and FRQ)</td><td>LO
2.31, 2.32, 2.33, 2.34, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.18, 3.19, 3.20, 3.21, 3.22, 3.23, 3.24, 3.25, 3.26, 3.29, 3.30, 4.7, 4.22

SP
1.1, 1.3, 1.2, 1.4, 4.1, 6.1, 6.2, 6.4, 6.5, 7.1, 7.2</td></tr>
</table>

<table>
<tr><td>Unit 6: Evolution & Phylogeny ~5 weeks</td><td>Campbell Chapters: 22, 23, 24, 25, 26</td></tr>
<tr><td>Topics:</td><td>Curriculum Framework:</td></tr>
<tr><td rowspan="2">• Lamarck vs. Darwin
• Evidence for evolution
• Factors influencing evolution
• Hardy-Weinberg equilibrium
• Speciation
• Origin of life on Earth
• Methods to analyze fossil evidence
• Endosymbiosis
• Taxonomic categories
• Phylogenetic trees</td><td>Big Idea 1, 2, 3, 4

Enduring Understanding:

1.A
1.B
1.C
1.D
2.E
3.C
4.B
4.C</td></tr>
<tr><td>Activities:</td><td>Essential Knowledge:</td></tr>
<tr><td>• Chapter readings and Reading Guides
• AP Lab 1: Artificial Selection
• Comparative Proteomics Lab: separate and analyze proteins from different species of fish, create cladograms
• AP Lab 2: Mathematical Modeling: Hardy-Weinberg
• Analyzing Fossils Activity
• Cases: My Brother’s Keeper or White-Striped Clover
• Watch video “What Darwin Never Knew?” with class discussion</td><td>1.A.1
1.A.2
1.A.3
1.A.4
1.B.1
1.B.2
1.C.1
1.C.2
1.C.3
1.D.1
1.D.2
2.E.1
2.E.2
3.C.1
4.B.3
4.C.3
4.C.4</td></tr>
<tr><td>Assessment:</td><td>Learning Objectives/Science Practices</td></tr>
<tr><td>• Artificial Selection – presentation of findings
• Lab Report – Comparative Proteomics
• Fossil Activity Write-up
• Written Analysis of Case Study
• Unit Exam (MC and FRQ)</td><td>LO
1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.10, 1.11, 1.12, 1.13, 1.14, 1.15, 1.16, 1.17, 1.18, 1.19, 1.20, 1.21, 1.22, 1.23, 1.24, 1.25, 1.26, 1.27, 1.28, 1.29, 1.30, 1.31, 1.32, 2.31, 2.32, 2.33, 2.34, 2.35, 2.36, 2.37, 3.24, 3.25, 3.26, 4.19, 4.25, 4.26, 4.27

SP
1.1, 1.2, 1.4, 1.5, 2.1, 2.2, 3.1, 3.3, 4.2, 5.1, 5.2, 5.3, 6.1, 6.3, 6.4, 6.5, 7.1, 7.2,</td></tr>
</table>

<table>
<tr><td>Unit 7: Plant Form & Function ~1 week</td><td>Campbell Chapters: 38-39</td></tr>
<tr><td>Topics:</td><td>Curriculum Framework:</td></tr>
<tr><td rowspan="3">Plant reproduction
Signal transduction pathways
Plant response to internal and external signals</td><td>Big Idea 2</td></tr>
<tr><td>Enduring Understanding:</td></tr>
<tr><td>2.D
2.E</td></tr>
<tr><td>Activities:</td><td>Essential Knowledge:</td></tr>
<tr><td>• Chapter readings and Reading Guides
• Participate in asynchronous discussion where students respond to a prompt concerning an ethical issue involving GMOs [CR 5]
• AP Lab 9: Transpiration
• Case: Corn Under Construction
• Unit Exam (MC and FRQ)</td><td>2.D.4
2.E.1
2.E.2
2.E.3</td></tr>
<tr><td>Assessment:</td><td>Learning Objectives/Science Practices</td></tr>
<tr><td>• Discussion Assessment
• Written Analysis of Case
• Transpiration Lab Report & Lab Notebook Evaluation
• Unit Exam (MC and FRQ)</td><td>LO
2.29, 2.30, 2.31, 2.32, 2.33, 2.34, 2.35, 2.36, 2.37, 2.38, 2.39, 2.40

SP
1.1, 1.2, 1.4, 4.2, 5.1, 6.1, 7.1, 7.2</td></tr>
</table>

<table>
<tr><td>Unit 8: Animal Form & Function ~5 weeks</td><td>Campbell Chapters: 40, 43, 45, 47, 48, 49, 51</td></tr>
<tr><td>Topics:</td><td>Curriculum Framework:</td></tr>
<tr><td rowspan="2">Homeostasis and feedback systems
Immune Response
Regulation by Hormones
Neurons and impulse transmissions
Brain regions and functions
Animal Behavior</td><td>Big Idea 1, 2, 3, 4
Enduring Understanding:</td></tr>
<tr><td>1.A
2.A
2.C
2.D
2.E
3.B
3.D
3.E
4.A
4.B</td></tr>
<tr><td>Activities:</td><td>Essential Knowledge:</td></tr>
<tr><td>Chapter readings and Reading Guides
Case Study: Back to the Bay
Research: Can stem cell-based therapy be used in brain and spinal cord injuries? Students will prepare presentations of their findings and responses to questions such as: Should embryonic stem cell research continue to be permitted? Should it be supported by government funding? Do the origins of embryonic stem cell lines make a difference? (CR4c and CR5)
Lab – C. elegans Behavior
Unit Exam (MC and FRQ)</td><td>1.A.1
1.A.2
1.A.3
1.A.4
2.A.1
2.C.1
2.C.2
2.D.2
2.D.3
2.D.4
2.E.1
2.E.3
3.B.2
3.D.1
3.D.2
3.E.1
3.E.2
4.A.4
4.B.2</td></tr>
<tr><td>Assessment:</td><td>Learning Objectives/Science Practices</td></tr>
<tr><td>Written analysis of case
Animal Behavior lab report
Stem Cell Presentations
Animal Form & Function Quiz
Immune System Quiz
Endocrine and Nervous System Quiz
Animal Behavior Quiz
Unit Exam (MC and FRQ)</td><td>LO
1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.10, 1.11, 1.12, 1.13, 2.1, 2.2, 2.3, 2.15, 2.16, 2.17, 2.18, 2.19, 2.20, 2.21, 2.25, 2.26, 2.27, 2.28, 2.29, 2.30, 2.31, 2.32, 2.33, 2.34, 2.38, 2.39, 2.40, 3.22, 3.23, 3.31, 3.32, 3.33, 3.34, 3.35, 3.40, 3.41, 3.42, 3.43, 3.44, 3.45, 3.46, 3.47, 3.48, 3.49, 3.50, 4.8, 4.9, 4.10, 4.18

SP
1.1, 1.2, 1.3, 1.4, 1.5, 2.1, 2.2, 3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2, 5.3, 6.1, 6.2, 6.4, 7.1, 7.2</td></tr>
</table>

<table>
<tr><td>Unit 9: Ecology ~3 weeks</td><td>Campbell Chapters: 52, 53, 54, 55, 56</td></tr>
<tr><td>Topics:</td><td>Curriculum Framework:</td></tr>
<tr><td rowspan="2">Biomes: biotic and abiotic factors
Populations
Niche, competition, symbiotic relationships, keystone species, succession
Energy flow through ecosystems
Productivity
Biogeochemical cycles
Value of biodiversity
Human impact on the Earth</td><td>Big Idea 2, 4

Enduring Understanding:

2.A
2.D
2.E
4.A
4.B
4.C</td></tr>
<tr><td>Activities:</td><td>Essential Knowledge:</td></tr>
<tr><td>Chapter readings and Reading Guides
Biome project – students will investigate a biome and prepare a multimedia presentation to share with the class through our online course or blog
Environmental topics discussion[CR5]
AP Lab 12: Dissolved Oxygen and Primary Productivity (virtual)</td><td>2.A.1
2.D.1
2.D.2
2.D.3
2.E.3
4.A.5
4.A.6
4.B.3
4.B.4
4.C.4</td></tr>
<tr><td>Assessment:</td><td>Learning Objectives/Science Practices</td></tr>
<tr><td>Biome project showcase
Environmental topics discussion evaluation
Dissolved oxygen and primary productivity data analysis and conclusion
Unit Exam [MC and FRQ]</td><td>2.1, 2.2, 2.3, 2.22, 2.23, 2.24, 2.25, 2.26, 2.27, 2.28, 2.38, 2.39, 2.40, 4.11, 4.12, 4.13, 4.14, 4.15, 4.16, 4.19, 4.20, 4.21, 4.27

SP
1.3, 1.4, 2.2, 3.2, 4.1, 4.2, 5.1, 5.2, 6.1, 6.2, 6.3, 6.4, 7.1, 7.2</td></tr>
</table>

Science Practices Matrix for Major Labs

	Big Idea 1: Evolution	Big Idea 2. Cellular Processes	Big Idea 3: Genetics	Big Idea 4: Interaction	SP 1: Use representations and models	SP 2: Use mathematics	SP 3: Engage in scientific questioning	SP 4: Plan and implement data collection strategies	SP 5: Perform data analysis and evaluation of evidence	SP 6: Work with scientific explanations / theories	SP 7: Connect and relate knowledge
Scientific Method				X		X	X	X	X	X	X
Got Protein?		X		X			X	X	X		
Cellular Respiration		X		X	X	X	X	X	X	X	X
Photosynthesis	X	X			X	X	X	X	X	X	X
Cell Division – Mitosis & Meiosis			X			X	X	X	X		
Comparing DNA Sequences to Understand Evolutionary Relationships with BLAST	X				X		X			X	X
Cloning of a PCR Amplified Gene (Transformation and Electrophoresis)	X		X		X	X	X	X	X	X	X
Artificial Selection	X					X	X	X	X	X	X
Mathematical Modeling Hardy-Weinberg	X				X	X	X	X	X	X	X
Transpiration		X		X	X	X	X	X	X	X	X
Comparative Proteomics	X				X			X	X		X
C. elegans Behavior				X	X	X	X	X	X	X	X
Dissolved Oxygen and Primary Productivity (virtual)				X	X	X	X	X	X	X	X