

## 2022 Advanced Placement® Biology

### About the AP® Biology Summer Institute

Over the course of this workshop, new and experienced teachers alike will become familiar with the *Course and Exam Description (CED) in AP Biology* (2019). The CED organizes the course into eight commonly taught units:

- |                                       |  |
|---------------------------------------|--|
| <b>1: Chemistry of Life</b>           | <b>5: Heredity</b>                       |
| <b>2: Cell Structure and Function</b> | <b>6: Gene Expression and Regulation</b> |
| <b>3: Cellular Energetics</b>         | <b>7: Natural Selection</b>              |
| <b>4: Cell Cycle</b>                  | <b>8: Ecology</b>                        |

The major focus of this APSI will be on the CED and the resources available to teachers. The course framework clearly connects *each learning objective* to specific *essential knowledge*. It includes *biology-specific science practices* that build skills to help students learn to think and act like biologists.

Particularly important will be the time and skill set necessary to support teachers in implementing more inquiry-based investigations. Participants will be given tools and strategies for modifying traditional experiments into inquiry-based models. **Participants will become familiar with hands-on and virtual investigations** in the lab manual: *AP Biology Lab Investigations: An Inquiry-Based Approach* (2019). They will also explore creative alternatives to these investigations. We will examine the 2019 AP Biology Course and Exam Description (CED) and essay writing and grading. There will be time for teachers to begin working on their AP Biology course syllabus specific to their school's daily schedule and calendar and the AP Course Audit process. To learn more about AP Biology, please go to: <https://apcentral.collegeboard.org/courses/ap-biology/course/updates-2019-20?course=ap-biology> or [www.apcentral.collegeboard.org/Biology](http://www.apcentral.collegeboard.org/Biology)

**Online Learning Requirements:** The APSI will run for 6 hours daily, both synchronously and asynchronously, for five days. This time frame will meet the **College Board's 30-hour requirement** to become a **certified AP Biology teacher**. The synchronous and asynchronous times are as follows:

- **8:00-10:00 am PDT daily (synchronous)** will be spent in viewing presentations and demonstrations by the instructor, and in the group, discussions to discuss the CED content
- **10:00 am-1:00 pm PDT daily (asynchronous)** will be spent independently or with other participants working on assignments and activities (includes an hour for lunch)
- **1:00-3:00 pm PDT daily (synchronous)** will be spent on allowing time for the participants to observe the consultant or guest speaker model laboratory investigations and other activities and to give the participants time to discuss the CED and to ask questions about the AP Biology course framework, lab investigations, or the APSI assignments.

*\*The consultant will remain on Zoom after the morning and afternoon synchronous times to answer any questions you may have.*

#### Topics for the Week:

- Course and Exam Description and Course Planning
- Diversity and Inclusion & Equity and Access
- Strategies and Pedagogical Tools
- AP Classroom, AP Daily, and how to become part of the AP Community
- Summative Assessments: AP Biology 2022 Exam
- Reflection on the APSI Material

#### Goals for the Week:

- Learn how to use resources most effectively in implementing the Course and Exam Framework
- Discuss teaching strategies for the 13 AP Biology labs from the Investigative Lab Manual
- Share alternative and supplemental class and lab activities (CER mini-posters and Lab mini-posters)

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- Work on preparing a specific Lesson Plan and a Course Audit (if needed)
- Explore the AP Central website, AP Classroom, AP Daily, Course Audit Portal, AP Community
- Learn how the AP Biology Exam is constructed and scored (MCQs and FRQs)

## TENTATIVE SCHEDULE for the WEEK

### Day 1: Monday:

#### **Understanding the CED & Course Planning (Complete Key Takeaway Survey Day #1)\***

##### **Morning Session:**

- Discuss each section of the CED and make connections to the Curricular Requirements
- Learn how to build conceptual understandings by linking **Enduring Understandings (Concepts)** using testable **Learning Objectives** (what the students should be able to do) to **Essential Knowledge (Content)** for each of the **Big Ideas (Themes)**
- Use the **Science Practices (Skills)** and the **Essential Knowledge (Content)** to apply the content in new, relevant, and unfamiliar contexts

*You are responsible for completing these Lessons from the College Board Handbook during asynchronous times for the APBI: Directions will be given during synchronous times.*

**Activity: Lesson 3: Understanding the Course Content - CBH p. 29**

**Activity: Lesson 4: Understanding the Big Ideas – CBH p.35**

**Activity: Lesson 5: Exploring the 8 Unit Guides – CBH p. 41-42 Treasure Hunt: Appendix A**

Read through these lessons to participate in discussions at synchronous times.

**Treasure Map Lesson 5: Be able to give the answers to the Map questions.**

##### **Afternoon Session:**

- **Discuss the treasure Map Activity and Questions about Lessons 3, 4, and 5**
  - Information about Textbooks and Study Guides and Other Resources
  - Lab Equipment/Materials – Carolina, Ward's, Flinn, Bio-RAD, Probeware
  - Lab Manual: *AP Biology Investigative Labs: An Inquiry-Based Approach*
  - Lab Notebooks (Carbonless Life Science Lab Notebooks) and Lab Reports
- Practicing the Practices: Investigation 11 Transpiration BI 4-Whole Plant Method*

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**Activity: Lesson 1: Previewing the Science Practices - Teaching for Transfer – CBH p. 7**

**Activity: Lesson 16: Representing and Describing Data SP 4 CBH - p. 117**

**Activity: Lesson 17: Statistical Tests and Data Analysis SP 5 CBH – p. 123**

**Construct a table**

and a graph of the data from Investigation 11 - Transpiration

**Email this table and graph to [patmote7@gmail.com](mailto:patmote7@gmail.com) by the Day 2 Morning Session.**

### Day 2: Tuesday:

#### **Diversity and Inclusion & Equity and Access (Complete Key Takeaway Survey #2)\***

##### **Morning Session:**

- **Review Lessons 1,16 and 17 ... QUESTIONS?**
- Discuss curriculum adjustments and instructional strategies that will help to recruit and retain under-represented students (Diversity & Inclusion)
- Identify classroom-level policies and practices that enhance or restrict student opportunities to participate in AP (Equity & Access)
- Study the UDL: Universal Design for Learning-CBH p. 258
- Discuss how to develop a One-day Lesson Plan and how to develop a Semester and/or Year-long Instructional Plan that incorporates all the units, topics, and skills of the course, as referenced in the CED

*You are responsible for completing these Lessons from the College Board Handbook during the asynchronous times for the APBI: Directions will be given during synchronous times.*

**Activity: Lesson 9: Scaffolding and Spiraling the SP's – CBH p. 65**

**Activity: Lesson 13: Reviewing Instructional Approaches for Science Practices– CBH p. 105**

**Read through these lessons and participate in discussions at the next synchronous time.**

##### **Afternoon Session:**

- **Discuss Lessons 9 and 13... QUESTIONS?**

- **Guest Speaker: PTC and Standard Curve: Whitney Higgins from miniOne 1:30-3:00 pm PDT**
- **Activity: Sharing Favorite Labs: email these to Pat Mote: [patmote7@gmail.com](mailto:patmote7@gmail.com) *Practicing the Practices: Investigation 4 Diffusion, Osmosis, Water Potential BI 2*  
*Practicing the Practices: Investigation 12: Animal Behavior BI 4***

*You are responsible for completing this Lesson from the College Board Handbook during the asynchronous times for the APST: Directions will be given during synchronous times.*

**Lesson 10: Planning Your Course- CBH p. 81:**

**Create a One-day Instructional Lesson Plan for one topic from one of these three Units: 3, 4, or 6. Email the unit plan to [patmote7@gmail.com](mailto:patmote7@gmail.com) by the Day 3 Morning Session. Write your lesson plan in Appendix E Lesson Planning Template - CBH p. 258.**

### **Day 3: Wednesday:**

**Strategies and Pedagogical Tools (Complete Key Takeaway Survey #3)\***

#### **Morning Session:**

- **Discuss Activity: Lesson 10: Planning Your Course - CBH p. 81: Share Lesson Plans**
- Refer also to Appendix D: Calendar Template CBH pp. 247-257, and Appendix E: Lesson Planning Template CBH p. 258 for a semester or year-long planning
- Identify and explain various instructional strategies and tools that teachers can incorporate in their lesson plans to teach the content and skills in the Course and Exam Description
- **Activity: Sharing Favorite Strategies and Tools**
- **Explain how teachers need a deep understanding of content and application**

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**Activity: Lesson 14: SP 2 – Visual Representations - CBH p. 107**

**Activity: Lesson 15: SP 3 – Questions & Methods - CBH p. 113**

**Activity: Lesson 18: SP 6 – Argumentation - CBH p. 129**

*Read through these lessons to understand these Science Practices better.*

**Select one lab that focuses on one of the 6 Science Practices. Describe the lab and Explain How the lab will help your students master this Science Practice Skill. Email this assignment to [patmote7@gmail.com](mailto:patmote7@gmail.com) by the Day 4 Morning Session.**

#### **Afternoon Session:**

- **Discuss Lessons 14, 15, 18...QUESTIONS?**
- Mini-posters and CER - View samples of Lab mini-posters and CER mini-posters
- Time, practice, and feedback – The understanding of content is earned over time.

*Practicing the Practices: Investigation 2: Hardy-Weinberg BI 1*

*Practicing the Practices: Chi-Square Analysis: Woolly Worm Lab BI 1*

*You are responsible for completing these Lessons from the College Board Handbook during the asynchronous times for the APST: Directions will be given during synchronous times.*

**Activity: Lesson 19: Concept Explanation SP 1 CBH- p. 137**

**Read through Lesson 19 to understand this Science Practice better.**

### **Day 4: Thursday:**

**AP Classroom, Community, Course Audit (Complete Key Takeaway Survey #4)\***

#### **Morning Session:**

- **Discuss Lesson 19 ... QUESTIONS?**
- **Note: The Cvent Survey from the College Board will be emailed at the end of today.**
- **Instructional Resources: AP Classroom (including updates) & AP Daily**
- Discuss examples of how AP Classroom can be utilized to develop each skill/practice using example student data provided by the College Board and develop lesson plans that reinforce topic and skill connections.
- Share how AP Daily can be used as a resource.
- **AP Central and AP Community**
- **AP Course Audit – Syllabus Review Activity**

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**Activity: Lesson 29: Joining the AP Community and Finding Additional Resources-CHB p. 227**

Read through this lesson and participate in discussions at the next synchronous time.

Afternoon Session:

- Instructional Planning Report (IPR) – **CBH Lesson 10, p. 82-85** Interpreting this data to identify student strengths and weaknesses and reflect on implications for instruction.
- **Guest Speaker: Bio-Bits-The Central Dogma: Allison Nishitani from miniPCR 1:30-3:00 pm PDT**  
**Practicing the Practices: Investigation 9: Biotechnology BI 3 (Handout)**
  - **Alternative Investigation 9 Virtual DNA Gel Electrophoresis MiniOne**  
<https://dnlc.cshl.edu/resources/animations/gelectrophoresis.html>

**Practicing the Practices: Investigation 8: Biotechnology: Bacterial Transformation BI 3**

- **Alternative Investigation 8: Virtual pGLO Bacterial Transformation**  
[http://www.phschool.com/science/biology\\_place/labbench/lab6/concepts1.html](http://www.phschool.com/science/biology_place/labbench/lab6/concepts1.html)

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**Activity: Lesson 27: AP Course Audit and Curricular Requirements – CBH p. 213**

Read through this lesson and participate in discussions at the next synchronous time.

Read through the syllabus on your course audit site. You may use the Syllabus Review Activity to check for completeness.

Identify the Task Verbs found on the AP Biology Exam and Explain how these verbs can be associated with the Science Practices (Skills): Take the Task Verbs identified on p. 199 in the Exam Information Section of the CED and connect each verb to a specific Science Practice listed on pp. 178-189 in the Course Framework Section of the CED. Email this assignment to [patmote7@gmail.com](mailto:patmote7@gmail.com) by the Friday Morning Session.

Day 5: Friday:

Assessment: 2021 AP Biology Exam (**Complete Key Takeaway Survey #5**)\*

Morning Session:

- **QUESTIONS about the Course Audit: Lesson 27, p. 213**
- **QUESTIONS about the Instructional Planning Report (IPR): Lesson 10, p. 83**
- Teaching for Understanding and Transfer
- **Guest Speaker: Matthew Huber from Algae Research Supply - 9:00-10:00 am PDT**  
**Practicing the Practices: Investigation 5: Photosynthesis BI 2**  
**Practicing the Practices: Investigation 6: Cellular Respiration BI 2**  
**Alternative Investigation 5 Photosynthesis and Investigation 6 Cellular Respiration**  
[https://www.amazon.com/Algae-Research-Supply-Ready-go/dp/B07YXDJF2B/ref=sr\\_1\\_1?dchild=1&keywords=algae%20beads&qid=1586885185&sr=8-1&fbclid=IwAR2aintxcd9otVjvhpIBVngKLTsNaLRTTEBNcdYAEiyrnwPxCMeyqEoq9vA](https://www.amazon.com/Algae-Research-Supply-Ready-go/dp/B07YXDJF2B/ref=sr_1_1?dchild=1&keywords=algae%20beads&qid=1586885185&sr=8-1&fbclid=IwAR2aintxcd9otVjvhpIBVngKLTsNaLRTTEBNcdYAEiyrnwPxCMeyqEoq9vA)

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**Activity: Lesson 23: Using PPC's as Formative Assessments CBH – p. 175**

Be able to explain the difference between Formative and Summative Assessments.

**Activity: Lesson 22: AP Biology Exam Structure for 2021 – CBH p. 167**

Use this Lesson to help you understand the format of the 2021 AP Biology Exam.

Afternoon Session:

- Formative vs. Summative Assessment: **Lesson 23 of CHB...QUESTIONS?**
- AP Biology Exam Structure – new in 2021 CED p. 193 – Remember UBD and Lesson 22 of CBH
- Activity: A close look at the 2022 AP Biology Exam FRQs (Scoring Guidelines and Sample Responses)
- Activity: Making Time to Review for the AP Biology Exam

Reflection on the activities of the week and complete the **APSI Cvent Survey**

**What to bring:**

Items you should have access to during the week include:

- A laptop computer/ tablet
- Access to Zoom, Google Chrome, and Google drive
- Stable internet connection
- Microphone and web camera
- A favorite lesson or practice to share
- A copy of your school's academic calendar
- A copy of the textbook you will be using next year (if you have access to one)
- AP Biology Course and Exam Description (to be provided by the Institute)
- AP Biology Workshop Handbook (CBH) (to be provided by the Institute)
- AP Biology Investigative Lab Manual (ILM) (to be provided by the Institute)
- **From the AP Consultant Pat Mote:** AP Biology Consultant Notebook (CN) and 2022 AP Biology Exam Questions, Scoring Guidelines, and Sample Responses

**Instructor:**

**Patricia Mote** taught biology at the high school level for over thirty years serving as department chair for many of these years. She has been an instructor and lecturer at the college level for 29 years. She holds degrees in Microbiology, Genetics, and Science Education from the University of Georgia. While serving as a consultant for the College Board since 1991, she has conducted one-day workshops and summer institutes at various schools and universities all over the country.

She has been involved with the AP Reading to score the free-response questions from the AP Biology Exam since 1992, serving as a reader, table leader, question leader, and exam leader. She helps develop Multiple-Choice and Free Response questions for the AP Biology Exams. She currently serves as the chair of CLEP (the College-Level Examination Program) for the Educational Testing Service and is a member of the College Board's National Science Advisory Committee.

As a high school teacher, she received numerous awards, including being named high school Teacher of the Year many times and Teacher of the Year for her school district. She was named the Biology Teacher of the Year for Georgia and a Tandy Technology Scholar. In 2003, she received the Siemens Award in Biology for her work with minority students in the AP program. Her students have also selected her as their STAR Teacher numerous times.

She has developed Test Banks for Human Anatomy and Physiology textbooks and several AP Biology textbooks and has had items published in The College Board's Materials for Professional Workshops. She serves as an editor for articles for The American Biology Teacher. She has edited numerous editions of Human Anatomy and Physiology textbooks. Other publications include articles for several microbiology journals from research conducted at the Centers for Disease Control in Atlanta and three instructors' guides for AP Biology. For 17 years during the summer months, she taught a Molecular Biology Program at the Georgia Institute of Technology in Atlanta.

Patricia resides in Atlanta, Georgia. She is currently a Lecturer and Lab Instructor for Human Anatomy and Physiology, Majors Biology, and Non-majors Biology courses at Georgia State University-Perimeter College.