

Cherry Creek High School *Online AP Biology APSI 2020* Pat Mote - AP Consultant

Course Description: 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:

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

The major focus of this online APSI will be on the CED, lab investigations, and the resources available to teachers. The course framework clearly connects *each learning objective* to specific *essential knowledge* and 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 both hands-on and virtual investigations** in the manual *AP Biology Lab Investigations: An Inquiry-Based Approach (2019)* as well as explore creative alternatives to these investigations. We will also examine the new AP Biology Exam design, essay writing, and essay grading. There will be time for teachers to begin working on their AP Biology 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 AP Central AP Biology: <https://apcentral.collegeboard.org/courses/ap-biology/course/updates-2019-20?course=ap-biology>

Online Learning Requirements: Participants must have a laptop/computer, WiFi/internet, LMS: Google Classroom and Zoom, as well as a willingness to exchange effective teaching practices with peers in an online platform. The APSI will run for 6 hours daily both synchronously and asynchronously each day for the 5 days. This time frame will meet the College Board's 30-hour requirement to become a certified AP Biology teacher. One-third of the time daily will be spent viewing presentations and demonstrations by the instructor, one third of the time will be spent working with other participants on assignments and activities, and one-third of the time will be spent allowing the instructor time to model laboratory investigations and giving the participants time to discuss and ask questions about the AP Biology course.

We will:

- Learn how to use existing resources most effectively in implementing the Course Framework
- Discuss teaching strategies for all of the 13 AP Biology labs from the Student Lab Manual
- Select a minimum of two lab investigations to do for each of the four Big Ideas
- Share alternative and supplemental lab activities
- Share CER (Claim, Evidence, and Reasoning) activities
- Work together on preparing specific lesson plans
- Work together on preparing a Course Audit (as needed)
- Review Sample Syllabi, AP Central website, AP Classroom, Course Audit portal

Key Takeaways for the Week for the Participants:

- Understanding the Course and Exam Description (CED)
- Planning the Course
- Teaching the Course
- Assessing Student Progress and Understanding
- Becoming a part of the AP Community

Tentative Schedule for the Week

Day 1: Key Takeaway: Understanding the Course and Exam Description (CED)

College Board Handbook (CBH), Consultant's Notebook (CN), AP Biology Lab Manual, AP Biology 2019 Sample Student Responses, Textbook Information

The Course Framework:

Activity: Lesson 3: Understanding the Course Content - CBH p. 29-34

Activity: Lesson 4: Understanding the Big Ideas – CBH p.35-39

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

- Building conceptual understandings by linking testable Learning Objectives to the Essential Knowledge (Content) for each Big Idea.
- Applying content in new, relevant, and unfamiliar contexts, using the Science Practices (Skills) and the Essential Knowledges (Content).

Lab Equipment/Materials – Ward's, Carolina, Flinn, Bio-RAD, Probeware

Lab Manual: *AP Biology Investigative Labs: An Inquiry-Based Approach*

Practicing the Practices: Investigation #11 Transpiration SP 1, 2, 4 - BI 4 (Set up)

Assignment: Lesson 1: Previewing the Science Practices - Teaching for Transfer – CBH p. 7-14

Day 2: Key Takeaway: Planning the Course

Activity: Lesson 1: Previewing the Science Practices-Teaching for Transfer-CBH p. 7-14

Activity: Lesson 9: Scaffolding and Spiraling the SP's – CBH p. 65-70

Activity: Reviewing Instructional Approaches

Activity: Planning Your Course (plan your course with teachers with similar schedules)

Equity and Access and Diversity of Learners

Lab Notebooks, Lab Reports, Mini-posters for Lab and CER Activities

Practicing the Practices: Investigation #4 Diffusion and Osmosis SP 5 - BI 2

Practicing the Practices: Investigation 12: Animal Behavior SP 3, 4, 5 - BI 4

Practicing the Practices: Transpiration Data Collection Day 2

Assignment: Lesson 10: Planning Your Course- CBH p. 81-88: Create an Instructional Plan

Day 3: Key Takeaway: Teaching the Course

Activity: Lesson 10: Planning Your Course-CBH p. 81-88: Share Instructional Plans

- Using effective instructional strategies to help develop course skills and content
- Practice makes perfect
- Teachers need a deep understanding of content and applications

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

Gallery Walk to view samples of Mini-posters and CER posters

Practicing the Practices: Investigation 4: Water Potential SP 2, 5 - BI 2

Practicing the Practices: Investigation 5: Photosynthesis SP 4 -BI 2

Practicing the Practices: Investigation 2: Hardy-Weinberg SP 2, 5 - BI 1

Practicing the Practices: Transpiration Data Collection Day 3

Assignment: Create an Instructional Plan for a Second Unit from the Course Framework
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Day 4: Key Takeaway: Assessing Student Progress and Understanding

Activity: Share Instructional Plans

Activity: Lesson 17: Statistical Tests and Data Analysis SP 5 CBH – p. 123-127

Activity: Using PPC's as Formative Assessments

- Aligning assessments and instruction to learning goals and performance standards
- Challenging students to apply their knowledge and skills in different contexts for a deeper understanding of the content
- Time, practice and feedback
- Understanding is earned over time

Practicing the Practices: Chi Square Analysis: Woolly Worm Lab SP 3 - BI 1

Practicing the Practices: Investigation 9: Biotechnology SP 2, 4

Student-centered Electrophoresis Activities - miniPCR

Practicing the Practices: Transpiration Data Collection Day 4

Day 5: Key Takeaway: Course Audit, AP Biology Exam, and AP Community

Activity: Lesson 27: AP Course Audit and Curricular Requirements – CBH p. 213-218

Activity: Lesson 22: AP Biology Exam Structure for 2020 – CBH - p. 167

Activity: Scoring of the 2019 Exam

Activity: Analyzing Science Practices and Learning Objectives on Exam Questions

Activity: Making Time to Review for the AP Biology Exam

Activity: Becoming a member of the AP Teacher Community

Activity: Sharing Favorite Activities or Labs

Practicing the Practices: Transpiration Data Collection Day 5-Results and Observing Stomata

Alternative Investigation 5 Photosynthesis and Investigation 6 Cellular Respiration

[https://www.amazon.com/Algae-Research-Supply-Ready-](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=IwAR2aintxcd9otVjvhplBVnqKLtSNalRTTEBNcdYAeiyrnwPxCMeygEog9vA)

[go/dp/B07YXDJF2B/ref=sr_1_1?dchild=1&keywords=algae%20beads&qid=1586885185&sr=8-1&fbclid=IwAR2aintxcd9otVjvhplBVnqKLtSNalRTTEBNcdYAeiyrnwPxCMeygEog9vA](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=IwAR2aintxcd9otVjvhplBVnqKLtSNalRTTEBNcdYAeiyrnwPxCMeygEog9vA)

Alternative Investigation 8: Virtual pGLO Bacterial Transformation

http://www.phschool.com/science/biology_place/labbench/lab6/concepts1.html

Alternative Investigation 9 Virtual DNA Gel Electrophoresis MiniOne

<https://dnalc.cshl.edu/resources/animations/gelectrophoresis.html>

Alternative Investigation 12 (Virtual): Behavior in Mealworms

http://www.mhhe.com/biosci/genbio/virtual_labs_2K8/labs/BL_18/index.html

SCIENCE PRACTICES = SKILLS

Science Practice 1: Lesson 19 – Concept Explanation - CBH p. 137

Science practice 2: Lesson 14 – Visual Representations – CBH p. 107

Science Practice 3: Lesson 15 – Questions and Methods – CBH p. 113

Science Practice 4: Lesson 16 – Representing and Describing Data – CBH p. 117

Science Practice 5: Lesson 17 – Statistical Tests and Data Analysis – CBH p. 123

Science Practice 6: Lesson 18 – Argumentation - CBH p. 129