Course Description - Advanced Placement Summer Institute, Biology 2022

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During this workshop, AP Biology teachers will become familiar with the recently updated *Course and Exam Description (CED) in AP Biology* (2019). The updated CED organizes the course into eight commonly taught units:

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

The major focus of this online Advanced Placement Summer Institute will be on the CED, lab investigations, and the new resources available to teachers. The updated 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 and 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**, including many in the updated lab manual *AP Biology Lab Investigations: An Inquiry-Based Approach* (2019). We will also discuss tips, tricks, and alternatives to these lab investigations. Participants will delve into the new AP Biology exam design and essay grading. There will be time carved out for teachers to begin working on their AP Biology syllabus specific to their school's daily schedule and calendar so the AP Course Audit process will be made easier.

Materials: Participants must bring a laptop or tablet with internet access

We will:

- Discuss teaching strategies for AP Biology labs.
- Design and conduct labs, both hands-on and using virtual lab tools.
- Conduct data analysis and identify options for student reporting.
- Learn how to use existing resources most effectively in implementing the changes in the Curriculum Framework.
- Share alternative and supplemental lab activities and CER (Claim, Evidence, Reasoning) activities.
- Work together on preparing a course audit (as needed).
- Review pacing guides, sample syllabi, textbooks, and how to navigate the AP Central website, APClassroom, and the course audit portal.

Key Takeaways for Participants include the following:

1. Understanding the redesigned Course
2. Planning to teach the Course
3. Teaching the Course
4. How to assess student progress and understanding
5. Becoming a member of the AP Biology Community

4-Day Workshop Agenda - APSI Biology 2022

Day 1

Welcome, introductions, K-W-L sharing
Practicing the Practices:
Lab #1: Penny Lab and Statistical Analysis
Resources to Teach Statistical Analysis
Lab #2: Surface Area/Volume
Lab #3: Unknown Solutions (Osmosis Lab)
Calculating Water Potential

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

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

Activity: Teaching for Transfer by Applying the Science Practices
Activity: Teaching for Understanding of Content and Skills
Activity: Understanding the Course Framework and Big Ideas

To do before Day 2 –
Review the background and lab procedure for the following labs: Bacterial Transformation, PCR/Gel Electrophoresis, and Bioinformatics

Day 2

Practicing the Practices
Lab #4a: Bacterial Transformation Day 1
Lab #5: MiniOne PCR/Gel Electrophoresis
Lab #6: Bioinformatics

Key Takeaway 2: Planning the Course

- Sequencing, Pacing, Scaffolding

Activity: Exploring the Unit Guides (and treasure hunt map)
Activity: Scaffolding and Spiraling the Science Practices
Activity: AP Audit and Curricular Requirements
Activity: Planning Your Course (plan the first quarter of your course)
Activity: Reviewing Instructional Approaches

To do before Day 3 –
Review the background and lab procedure for the following labs: Photosynthesis

Day 3

Practicing the Practices
Lab #4b: Bacterial Transformation Day 2
Lab #7: Photosynthesis

Key Takeaway 3: Teaching the Course

- Teachers need a deep understanding of content and applications
- Using effective instructional strategies to help develop course skills and content knowledge
- Creating a community within a classroom

Activity: Science Practice 2 – Visual Representations
Activity Science Practice 3 – Questions & Methods

To do outside of class –
Complete unit overview for unit 1 of your class

Day 4

Practicing the Practices
Lab #7: Hardy-Weinberg and Mathematical Modeling
Lab #8: Enzyme Catalysis with Yeast Spheres
Lab #4c: Bacterial Transformation Day 3

Key Takeaway 4: Assessing Student Progress and Understanding

- Aligning assessments and instruction to learning goals and performance standards
- Challenging students to apply their knowledge and skills in different contexts for deeper understanding
- Time, practice and feedback

Activity: Analyzing Science Practices and Learning Objectives on Exam Questions
Activity: AP Biology Exam Structure
Activity: Using Personal Progress Checks as Formative Assessments
Activity: Scoring Free Response Questions
Activity Science Practice 5 – Statistics and Data Analysis
Activity Science Practice 6 – Argumentation

Key Takeaway 5: Becoming a Member of the AP Community

- Course Audit and Curricular Requirements
- AP Teacher Community and Additional Resources
- Evaluations of workshop