



**Biology for Experienced AP Teachers**  
**George Washington High School; Charleston, WV**  
**July 10-13, 2018**

Facilitated by: Brenda Royal  
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*Participants in this workshop will have the opportunity to:*

- share hints for improving student achievement.
- participate in content updates.
- discuss the new AP Biology Curriculum Framework.
- explore the changes in the AP Biology exam.
- learn how to incorporate inquiry into the AP Biology curriculum.
- perform selected laboratory investigations and share ideas for implementing these activities in the classroom (time permitting).
- receive suggestions on how to develop and/or revise an AP Biology course.
- network and develop a support system with other workshop participants.

## College Board Equity & Access Statement

The College Board strongly encourages educators to make equitable access a guiding principle for their AP programs by giving all willing and academically prepared students the opportunity to participate in AP. We encourage educators to:

- Eliminate barriers that restrict access to AP for students from ethnic, racial and socioeconomic groups that have been traditionally underserved.
- Make every effort to ensure their AP classes reflect the diversity of their student population.
- Provide all students with access to academically challenging course work **before** they enroll in AP classes.

Only through a commitment to equitable preparation and access can true equity and excellence be achieved.

# Daily Schedule

*This schedule is a guide for what we hope to accomplish during our APSI. Some activities may have to be adjusted according to the pace of the class, results of lab work, needs of the class, or due to unforeseen circumstances. Participants will be given as much advance notice as possible when changes occur. Your indulgence and flexibility are appreciated.*

Tuesday July 10, 2018	
Big Idea 1: Evolution Drives the Diversity & Unity of Life	
Hour	Activities
8:00-12:00	Welcome and Introductions Review of Schedule & Materials Investigations: Pillbug Behavior Origins of Life Set up Whole Plant Transpiration Incorporating Inquiry into the AP Biology Classroom What is inquiry? Levels of inquiry Essential features of inquiry Modifying traditional labs Science Practices
12:00-12:45	Lunch
12:45-4:00	Investigation #2 Mathematical Modeling, Hardy Weinberg-old lab Investigation #3: Comparing DNA Sequences with Blast Evolution Resources and Alternative Labs ENSI Fishy Frequencies Case Study: "Murder by HIV"  Share your Best Practices for Big Idea I

*I will be setting up labs every afternoon after the last session. You are welcome to stay to ask questions, make comments, and assist with set-up (so you know what to expect when you do the lab).*

**Wednesday, July 11, 2018**  
**Big Idea 2: Cellular Processes: Energy and Communication**

8:00 am - 8:30 am	Big Idea 2: Enduring Understandings, Essential Knowledge & Learning Objectives
8:30 am - 10:00 am	"Investigation #4: Diffusion and Osmosis"
10:00 am - 10:30 am	Diversity in the Classroom: Equity & Access
10:30 am – 12:00noon	Investigation #5: Photosynthesis
12:00-12:45 pm	Lunch
12:30 pm – 1:15 pm	Free Response Questions <ul style="list-style-type: none"> <li><input type="checkbox"/> Scoring the 2014 FRQ's</li> <li><input type="checkbox"/> Teaching Students How to Answer FRQ's</li> <li><input type="checkbox"/> Tips for Grading FRQ's</li> </ul>
1:15 pm – 1:45 pm	Writing Exam Questions - Resources for writing each Big Idea
2:00 pm - 4:00 pm	Case Study: "The Mystery of the Seven Deaths: A Case Study in Cellular Respiration" Investigation #6: Cellular Respiration Mini-Poster Session Share your Best Practices for Big Idea 2

**Thursday July 12, 2018**  
**Big Idea 3: Genetics and Information Transfer**

8:00 am – 8:45 am	Complete Diffusion & Osmosis Lab <ul style="list-style-type: none"> <li><input type="checkbox"/> Collect Data</li> <li><input type="checkbox"/> Calculate Water Potential</li> <li><input type="checkbox"/> Report Results</li> </ul>
8:45 am - 9:15 am	Big Idea 3: Enduring Understandings, Essential Knowledge & Learning Objectives
9:15 am - 10:30 am	Investigation #8: Biotechnology: Bacterial Transformation
10:30 am – 12:00 am	Syllabus Development The AP Audit College Board Resources Reviewing for the Exam What to Do After the Exam
12:00-12:45 pm	Lunch
12:45 pm - 2:00 pm	Investigation #9: Biotechnology: Restriction Enzyme Analysis of DNA Plasmid Mapping Activity
2:15 pm – 2:45 pm	Writing Exam Questions

2:45 pm – 4:00 p.m.	<b>M&amp;M's Chi-Square Activity</b> Investigation #7: Cell Division: Mitosis and Meiosis Share Your Best Practices for Big Idea 3
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**Friday, July 13, 2018**  
**Big Idea 4: Interactions**

8:00 am - 10:00 am	Calculation of Transformation Efficiency Wrap up Whole Plant Transpiration, Lab #11
10:00 am - 10:30 am	Big Idea 4: Enduring Understandings, Essential Knowledge & Learning Objectives
10:30 am - Noon	Investigation #10: Energy Dynamics
12:00 - 12:45 pm	Lunch
12:45 pm - 1:30 pm	Using the Curriculum Framework to Design Instruction Formative & Summative Assessments
1:30 pm - 3:00 pm	Lab #13: Enzyme Activity
3:00 pm - 3:30 pm	Writing Exam Questions
3:30 pm -4:00 p.m.	Wrap Up Unfinished Business from Earlier in the Week Review & Summary Evaluations Door Prizes

# Transitioning to Inquiry in AP Biology: Recommended Resources

## **Books**

*Inquiry and the National Science Education Standards: a Guide for Teaching and Learning.* Washington: National Academy, 2008. Print.

Llewellyn, Douglas. *Teaching High School Science through Inquiry: A Case Study Approach.* Thousand Oaks: Corwin, 2005. Print.

Llewellyn, Douglas. *Differentiated Science Inquiry.* Thousand Oaks, CA: Corwin, 2011. Print.

Llewellyn, Douglas. *Inquire Within: Implementing Inquiry-based Science Standards.* Thousand Oaks, CA: Corwin, 2002. Print.

## **Articles**

Bell, Randy, Laura Smetana, and Ian Binns. "Simplifying Inquiry Instruction: Assessing the Inquiry Level." *The Science Teacher* October (2005): 30-33. Print.

Eisenkraft, Arthur. "Expanding the 5E Model: A Proposed 7E Model Emphasizes "transfer of Learning"." *The Science Teacher* 70.6 (2003): 56-59. Print.

Friedrichsen, Patricia Meis, and Amy Pallant. "French Fries, Dialysis Tubing & Computer Models: Teaching Diffusion & Osmosis Through Inquiry & Modeling." *The American Biology Teacher* 69.2 (2007): E22-27. Print.

Leonard, Willam H., and John Penick. "Is the Inquiry Real? Working Definitions of Inquiry." *The Science Teacher* September (2009): 40-43. Print.

Marshall, Jeff, Robert Horton, and Chris White. "EQUIPPing Teachers: A Protocol to Guide and Improve Inquiry-based Instruction." *The Science Teacher* May/June (2009): 46-53. Print.

## **Case Studies**

"Case Study Collection - National Center for Case Study Teaching in Science." *University at Buffalo Libraries.* Web. 26 Oct. 2011.

<<http://ublib.buffalo.edu/libraries/projects/cases/ubcase.htm>>.

"CASES Online: Creating Active Student Engagement in the Sciences" *Emory University.* Web. 4 June 2012. <<http://www.cse.emory.edu/cases/>>.

# Words of Wisdom About Adding Inquiry to Your Classroom

**By Bobbie Hinson, AP Biology Teacher  
Providence Day School  
Charlotte, NC**

Biology teacher Bobbie Hinson, who has taught for 40 years, is both excited and nervous about the upcoming changes to the AP Biology curriculum. When asked for advice for her colleagues as they start thinking about how to incorporate inquiry in their laboratory instruction, she came up with the following 5 tips.



1. Learn all you can about teaching science through inquiry. Whether you're a novice or a master teacher, it isn't wise to jump into this strategy without preparation. Read everything you can about it. Although many books about inquiry-based instruction are available, one stands out for high school teachers: *Teaching High School Science Through Inquiry: A Case Study Approach* by Douglas Llewellyn.
2. Don't expect to do it all the first year. Becoming competent in inquiry-based instruction is a journey. Try it, reflect, collaborate with colleagues, and evaluate.
3. Modify your activities and labs a little at a time to make them more inquiry-based. You can't revamp your entire repertoire at once.
4. Students may vary in their acceptance of the push towards inquiry. They may be very excited in the beginning, but as they realize they must become more responsible for their own learning, they may resist. Stick with it! As they become empowered and experience the excitement of learning through this strategy, they become more accepting and fulfilled.
5. Finally, get comfortable with your changing role and the changing climate within the classroom. You must hone your questioning skills and your classroom management to create an atmosphere conducive to inquiry-based instruction. Remember, this takes time. You won't become an expert overnight!

From: <http://www.carolina.com/category/teacher+resources/big+idea+biology/words+of+wisdom.do>

For participants seeking graduate credit:

Workshop participants desiring graduate credit need to prepare a course scope and sequence, tying the four big ideas to their teaching schedule. This should include:

Including the critical labs and/or the labs we covered during the week.

Inserting school vacations, days off, allowance for snow days.

Time for review testing prior to the AP Exam

Ideas for post-exam projects

Brenda Royal will be glad to spend some time with you after class to help and make suggestions. This should be a project that helps you lay out your course in a meaningful way.