Advances in AP: The AP Redesign

AP is a community of educators who work together to cultivate the potential of all motivated and prepared students

Over 136,000 U.S. public high school teachers taught an AP course in school year 2010-11

Over 22,000 AP Coordinators, counselors, and principals administered AP Exams or used AP data to shape their schools’ programs in school year 2010-11
We collaborate with higher education institutions to ensure a commitment that AP represents a college-quality experience.

More than 5,800 college faculty:
- review AP course syllabi
- develop and validate AP curricula
- develop AP Exams
- score AP Exams.

More than 3,300 U.S. colleges and universities received AP scores for credit, placement, and/or consideration in the admission process.

Colleges Represented in AP Validation

Amherst College, Arizona State University, Auburn University, Baylor University, Boston College, Bowdoin College, Brigham Young University, California Institute of Technology, Rutgers University, Carnegie Mellon University, Clemson University, College of Wooster, Davidson College, Dickinson College, Duke University, Grinnell College, George Washington University, Georgia Institute of Technology, Harvard University, Johns Hopkins University, Middlebury College, Michigan State University, Oberlin College, Ohio State University, Purdue University, Rice University, Stanford University, Swarthmore College, The College of New Jersey, The College of William & Mary, Trinity University, Tulane University, UNC Chapel Hill, U.S. Military Academy, University of California San Diego, University of Chicago, University of Delaware, University of Illinois at Urbana-Champaign, University of California, Irvine, University of British Columbia, University of Central Florida, University of Iowa, University of Kentucky, University of Maryland, University of Massachusetts, University of Miami, University of Oklahoma, University of Notre Dame, University of Pennsylvania, University of Rochester, University of Southern California, University of Tennessee, University of Utah, University of Virginia, University of Wisconsin, Vanderbilt University, Vassar College, Virginia Tech, Villanova University, Wake Forest University, Wellesley College, Wesleyan University, Whitman College, Yale University.
Student success is rarely the result of just one element, and AP isn’t a comprehensive solution...But AP is a key ingredient

Regardless of ethnicity or socioeconomic status, successful AP students develop content knowledge, skills, and habits of mind that result in:

- higher first- and fourth-year college GPA (Hargrove, Godin, & Dodd, 2008)
- higher performance in sophomore-level college courses (Morgan & Klaric, 2007)
- higher likelihood of majoring in the particular subject in which they participated in AP, especially STEM subjects (Mattern, Shaw, & Ewing, 2011)
- higher 4-year bachelor’s degree attainment rates (Hargrove, Godin, & Dodd, 2008)

Fundamental questions we have been asking ourselves and others about AP

- How do we redefine the term rigor to reflect 21st Century realities?
- How can we provide AP teachers with the flexibility to make choices in what to emphasize and de-emphasize?
- How can we design exams that equally and appropriately assess skills and content?
- Should AP be in the vanguard of a discipline’s best practices, or should AP mimic introductory college course content coverage?
- How can we continue make a unique contribution by convening K-12 and higher ed stakeholders to develop valid, reliable assessment of student learning across fields, which foster sound pedagogy
Partnership for 21st Century Skills: The 4 C’s

Learning and Innovation Skills must complement core AP subject experience

*Critical thinking*
*Communication*
*Collaboration*
*Creativity*

While building core knowledge, students must also learn essential skills for success in today’s world, such as critical thinking, problem solving, communication and collaboration.

AP Sciences will now address core science practices

<table>
<thead>
<tr>
<th>Science Practices: The student can/is able to . . .</th>
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<tr>
<td>Use representations and models to communicate scientific phenomena and solve scientific problems.</td>
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<tr>
<td>Use mathematics appropriately.</td>
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<tr>
<td>Engage in scientific questioning to extend thinking or to guide investigations within the context of the AP course.</td>
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<tr>
<td>Plan and implement data collection strategies appropriate to a particular scientific question.</td>
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<tr>
<td>Perform data analysis and evaluation of evidence.</td>
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<tr>
<td>Work with scientific explanations and theories.</td>
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<tr>
<td>Connect and relate knowledge across various scales, concepts and representations in and across domains.</td>
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Clear learning objectives merge content with the 21st century skills needed for college and career.

Content

Transmission of information between neurons occurs across synapses.

Skill

The student can create representations and models of natural phenomena and systems.

Learning Objective

The student is able to create a visual representation to describe how nervous systems transmit information.

Excessive breadth, formally criticized in the NRC’s 2002 report, has been an impediment to depth and development of skills.

The National Research Council and National Science Foundation recommended changes to AP and IB science programs:

- The primary goal of AP and IB should be to help students develop a deep understanding of the organizing concepts and principles in Biology.
- Curricula for advanced study should emphasize depth of understanding over exhaustive coverage of content.
- Curricula should be focused on a reasonable number of concepts that can be studied in depth.

Learning and Understanding: Improving Advanced Study of Mathematics and Science in U.S. High Schools, National Research Council, 2002
The new AP Biology curriculum, released to the public on February 1, 2011, provides teachers with:

- clarity of focus
- flexibility
- reduced breadth

Major changes have been made to AP Biology

- **New approach:** Essential content + skills + inquiry
- **New structure:** Big Ideas and Enduring Understandings
- **New transparency into exam:** Learning Objectives, Formula Lists, Usage of Calculators
- **Breadth reduced to make time for deeper learning and inquiry**
  1. Factual recall reduced for exam
  2. Teacher choice of illustrative examples
  3. Explicit exclusion statements in Curriculum Framework
  4. Specific content reductions
The science practices and inquiry-based labs emphasize the 4Cs

Inquiry-based Labs: Students design and conduct their own experiments based on questions they pose themselves.

Science Practice 1: The student can use representations and models to communicate scientific phenomena and solve scientific problems.

Science Practice 3: The student can engage in scientific questioning to extend thinking or to guide investigations within the context of the AP course.

Science Practice 4: The student can plan and implement data collection strategies appropriate to a particular scientific question.

Rather than trying to cover all topics, teachers are given flexibility to select one specific example for in-depth study.

Certain human genetic disorders can be attributed to the inheritance of single gene traits or specific chromosomal changes, such as nondisjunction.

To foster student understanding of this concept, instructors can choose an illustrative example such as:

- Sickle cell anemia
- Tay-Sachs disease
- Huntington’s disease
- X-linked color blindness
- Trisomy 21/Down syndrome
- Klinefelter’s syndrome
AP Exam questions will look different

**Released 2008 AP Bio Question**

4. The energy required to run the Calvin cycle reactions of photosynthesis comes from which two substances produced during the light-dependent reactions?

   (A) ATP and NADPH  
   (B) ADP and PO4  
   (C) +H and O2  
   (D) O2 and CO2  
   (E) H2O and CO2

**Sample New AP Bio Question**

The chemical reaction for photosynthesis is:  

$$6 \text{CO}_2 + 12 \text{H}_2\text{O} + \text{light energy} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{O}_2 + 6 \text{H}_2\text{O}$$

If the input water is labeled with a radioactive isotope of oxygen, $^{18}\text{O}$, then the oxygen gas released as the reaction proceeds is also labeled with $^{18}\text{O}$. Which of the following is the most likely explanation?

   (A) During the light reactions of photosynthesis, water is split, the hydrogen atoms combine with the CO2, and oxygen gas is released.  
   (B) During the light reactions of photosynthesis, water is split, removing electrons and protons, and oxygen gas is released.  
   (C) During the Calvin cycle, water is split, regenerating NADPH from NADP+, and oxygen gas is released.  
   (D) During the Calvin cycle, water is split, the hydrogen atoms are added to intermediates of sugar synthesis, and oxygen gas is released.

All revised courses will receive a full slate of support materials to help AP teachers navigate the transition

**Course Overview**

- Curriculum Framework
- Course and Exam Description
- Practice Exam
- Video Tutorial

**Adapting to New Course**

- Consultant Training (2)
- AP Sl - Year 1 and Year 2
- One Day Workshop
- Online Event and/or Online PD Course
- Revised VTG and Pre-AP Workshop

**Course Audit Support**

- Syllabus Development Guide (scoring)
- Sample Syllabi (4)
- Online Audit Information/Support
- Course Pacing and Planning Guides (4)
- Sample textbook list

**Pedagogy and topic specific supports**

- Curriculum Module

**Online Teacher Community**

- Annotated Resource Guides
Courses undergoing larger changes -- like AP Biology -- will also receive a variety of additional support materials

Alignment of new Curriculum Framework to leading textbooks (by publishers)

Quantitative skills Materials
- Quantitative skills guide (document)
- Online event - quantitative skills

Inquiry based labs
- New Lab manual (document)
- Online event - launching new lab manual
- Online PD - Transitioning to Inquiry Labs (6 hours)
- 1 day workshop - Transitioning to Inquiry-Based Labs
- Included in APSIs (year 1 and year 2)

Pedagogy and topic specific (Online)
- New AP Biology Course Overview (6-hour)
- AP Biology Question/Item Writing (1-hour)
- Challenge Areas - Free Energy, Matter Exchange and Energy Capture (1-hour)
- Science Practices (predictions, explanations, models) (1-hour)
- Using Formative Assessments to Improve Instruction

Strong positive reactions to the AP Biology redesign

"The changes to the AP Biology course provide greater emphasis on the type of scientific inquiry that increases reasoning skills and conceptual understanding.... These revisions represent a major reform in science education that will enable many more young Americans to experience science as a special "way of knowing" about the world."
Bruce Alberts, Editor-in-Chief, Science

"The scientific community is reacting positively to the changes to the AP Biology exam...
...The changes will more closely align what goes on during a high school biology course with the current 'best practices' for introductory college biology"
Steven L'Hernault, Professor and Dept Chair, Emory University

"The College Board took criticisms to heart, and has been working with hundreds of college professors and high school teachers to develop the new approach."
NY Times (Jan 2011)
Four redesigned courses launched last fall, with three more in the queue for September 2012 and more to be announced in October.

Rollout Schedule of AP Course Changes

2011-12
- French Language
- German Language
- Italian Language\textsuperscript{*}
- World History\textsuperscript{*}

2012-13
- Biology
- Latin
- Spanish Literature

2013-14
- Chemistry
- Spanish Language

Students Who Earn 3+ on AP Exams Tend to Earn Higher GPAs in Subsequent Courses

Adapted from Morgan & Klaric, 2007
College & University AP Credit-Granting Policies

We recently surveyed more than 1,100 four-year US colleges, representing more than 33,000 individual exam policies. These included our top 200 score recipient colleges. We found that the most common minimum credit-granting score is a 3.

What does this data represent?
Most colleges and universities do not require the same score for all AP Exams for the purposes of granting credit and/or placement. XYZ University, for example, may grant credit for a minimum score of 3 on AP Calculus, but may require a minimum score of 4 on AP Psychology. Since we can’t say “XYZ University grants credit for a 3 or higher,” we evaluate policies on an exam-by-exam basis instead of college by college.

Guiding Questions for Discussion

- How do you anticipate the AP course and exam revisions will impact your teachers, students, administration?

- How can we leverage these changes and the new resources available through AP to strengthen curriculum and instruction across the middle school > high school > and college continuum?
Regroup, Recap, and Next Steps