Teaching Advanced Placement (AP) Chemistry

Paul C. Groves, Instructor
South Pasadena High School
pgroves@aol.com

Course Description:

This 45-hour equivalent course includes intensive sessions for teachers who are updating their existing AP chemistry course or exploring/designing a new course. The format of the AP chemistry exam is explored through materials supplied by The College Board. An examination of how the exam is graded illuminates techniques used by students to maximize their success on the exam. Four of the sessions focus on important chemistry topics and how each can be taught in a high school class. Additionally, laboratory activities appropriate for each topic are explored. Questions from released AP exams are used to illustrate the level of understanding required by students and relate the course content to the final assessment. Participants develop a resource list for each topic. Mini hands-on laboratory activities as well as full-scale laboratory experiments are introduced. Participants perform two of the laboratory activities at their school. Video and online resources that the instructor has found useful are explored. The teacher participants develop a teaching calendar for their course.

Required Texts:

- Workbook from The College Board (mailed to you before course begins).
- The college textbook you use for your course. If you are new to AP, find/borrow any college chemistry textbook.

Expected Outcomes:

By the end of the course, the participant will:

- be able to describe the format of the 2011 AP chemistry exam and explain how AP questions are scored.
- assemble a library of past exam questions and worked out problems.
- create a list of at least 25 new teaching ideas for some of the major AP chemistry topics (atomic theory, bonding, equilibrium, and oxidation-reduction).
- learn techniques to help teach the predicting reaction portion of the AP chemistry exam.
- create a list useful videos and online resources for teaching AP chemistry.
- collect laboratory activities that support the AP chemistry curriculum.
- perform at least two laboratory activities at their schools.
- network with other participants to share teaching ideas and expertise.
- collect a set of resources for four important AP chemistry topics.
- develop a teaching calendar for their course.

Course Requirements:

- Read assigned lectures and visit online resources.
- Work problems from past AP exams.
- Participate in weekly online discussion of session topics.
- Complete all homework assignments (no exceptions).

Due Dates:

- Each "week" begins on Wednesday and ends on the following Tuesday.
- All assignments should be posted any day during the week in which they are assigned unless otherwise specified.
- The main content for this course is found under "Course Content" in the Blackboard menu.
- Each week's lecture materials along with the detailed assignment will be posted there.
- The assignment may require the participant to post comments into a specified discussion forum. The discussion forums are located under "Discussion Board" in the Blackboard Menu.
- To successfully complete the course, the participant must complete all assignments, read all lectures/articles posted by the instructor, work all assigned problems, and obtain maximum points specified for the assignments. Participation is the key to having a fruitful experience. Many great ideas are shared in discussions and the questions you have about teaching AP chemistry can be answered there.

Description of Content by Weekly Session:

Teacher participants work through modules based on four of the most challenging topics in AP chemistry. The College Board-supplied materials are used extensively for released exam questions, grading, exam format, and possible course syllabi. For each topic, teachers develop a list of resources that can be used to teach that topic, including new teaching ideas, new laboratory activities, and new video and online resources that will enhance their teaching. Questions and problems from released exams are assigned and worked out. Two laboratory activities are performed by the participants at their own schools. The laboratories are written up and discussed with other participants.

I use Microsoft Word and Adobe Acrobat files that can be read by downloading the free Adobe Acrobat Reader. Assignments that are sent to me should be in Microsoft Word format or saved as Rich Text Format (.rtf).

Week 1: Introduction to the Format and Grading of the AP Chemistry Exam

Readings: see assignment page

A) **Autobiography:** Submit a brief autobiography in "Week One Forum Assignment A". Workshop participants generally vary from seasoned AP teachers to those who are exploring the idea of teaching AP chemistry. State how many years you have been teaching chemistry, how many years you have been teaching **AP** chemistry. Tell us what textbook you use, the number of students you have in your AP program, whether it is a first or second year program, and any unique points about your teaching situation. I am especially interested to hear the one most important thing that you are hoping to gain from this online course. Get acquainted by responding to others' autobiographies and by sharing goals. (worth 5 points)

B) **Exam Format:** Read the lecture information about the format and grading of the AP chemistry exam and the information in the College Board Workshop materials about the format of the exam. Develop a handout that describes to your students the format, timing, and calculator use on the AP chemistry exam. Use the Assignment on the Course Content Week 1 page and attach your handout (use Word or Rich Text Format) by clicking the link where it says "When you are ready to submit your assignment, click the link." (worth 5 points)

C) **Exam Grading:** Work assigned problems. Follow grading procedures in the lecture information for the various types of problems (math problem, predicting reactions, free-response questions, and explaining questions) to grade your own work. Post questions about the grading in "Week One Forum Assignment C" (worth 10 points; 5 points for doing the problems and 5 points for participating in the discussion) Note: You do not turn in your worked-out questions.

D) **Collect Past AP Questions:** Read the lecture information about where and how to collect past AP chemistry exam questions. Download Harvey Gendreau's collection of past AP questions. Post suggestions, comments, and questions in "Week One Forum Assignment D". (worth 5 points)

Week 2: Atomic Structure and Bonding

Readings: see online assignment page

A) **Resources:** Read the lecture materials about organizing these topics and a few of my favorite teaching ideas and resources. Post your ideas, comments, suggestions, and questions in the "Week 2 Resources" discussion forum. (worth 5 points)

B) **List of Resources:** Read the lecture materials, survey the lists of resources in the Discussion Forums, and examine the example List of Resources displayed. Create your own List of Resources for this topic that fits your teaching style, your students' learning styles, and your teaching situation. Send me a copy of your list using the Assignment at the end of the Week 2 lecture materials. (worth 5 points)

C) **AP Problems:** You are going to find that AP problems are very challenging and that the only way to learn to do them is by *doing them*. The first time I looked at AP problems, I couldn't do them. They do, however, get easier with practice. I tell my students that each time we work a new AP problem we add something to our "bag of tricks." By the time the AP exam arrives, the bag of tricks should be large and full. Try the assigned problems and examine the solutions. Think about what tricks are being added to your bag of tricks. Post your comments and questions in "Week 2 AP Problems" forum. (worth 5 points)

D) **List of Ideas:** As the course progresses, develop a list of at least 25 teaching ideas to add to your teaching repertoire. You can use 5 ideas per topic or any distribution you wish. These ideas can come from the lecture materials or from ideas shared by the other teacher participants. This will be due during week 5 and is worth 25 points.

Week 3: Predicting Reactions

Readings: see online assignment page

A) **Resources:** The predicting reactions section of the AP exam is unique to this exam. It utilizes its own skills and brings in ideas from the entire course. Read the lecture materials on how I approach this section of the AP exam and the tools and ideas I use. Read my suggestions on how to incorporate it into every chapter. Post your ideas, comments, suggestions, and questions in the "Week 3 Resources" discussion forums. (worth 5 points)

B) **List of Resources:** Read the lecture materials, survey the lists of resources in the Discussion Forums, and examine the example List of Resources displayed. Create your own List of Resources for this topic that fits your teaching style, your students' learning styles, and your teaching situation. Send me a copy of your list using the Assignment at the end of the Week 3 lecture materials. (worth 5 points)

C) **AP Problems:** Try the assigned problems and examine the solutions. Think about what tricks are being added to your bag of tricks. Post your comments and questions in "Week 3 AP Problems" discussion forum. (worth 5 points)

D) **List of Ideas:** Continue to collect ideas for your list of 25 teaching ideas.

E) **Laboratory Write-ups:** Throughout the five weeks, ideas for laboratory activities (both large and small) are presented by the instructor and the other teacher participants. Choose two of the laboratory activities, set them up and try them at your school. If you are not able to work at school during the summer, choose one of the household laboratory activities and do it in your kitchen. Turn in a write-up about the laboratory activity that includes what you did, what worked well for you, questions you have, and things you would change about the activity. These can be done anytime through week 5 (but don't procrastinate) and are worth 10 points each. These will be posted in "Week 3-6 Lab Write-Up Forum." (worth 10 points each)

Week 4: Equilibrium

Readings: see online assignment page

A) **Resources:** Read the lecture materials about organizing these topics and a few of my favorite teaching ideas and resources. Equilibrium usually covers three or four chapters in a textbook and is worth an especially close look. Post your ideas, comments, suggestions, and questions in the four "Week 4 Resources" discussion forum. (worth 5 points)

B) **List of Resources:** Read the lecture materials, survey the lists of resources in the Discussion Forums, and examine the example List of Resources displayed. Create your own List of Resources for this topic that fits your teaching style, your students' learning styles, and your teaching situation. Send me a copy of your list using the Assignment at the end of the Week 4 lecture materials. (worth 5 points)

C) **AP Problems:** Try the assigned problems and examine the solutions. Think about what tricks are being added to your bag of tricks. Post your comments and questions in "Week 4 AP Problems" discussion forum. (worth 5 points)

D) **List of Ideas:** Continue to collect ideas for your list of 25 teaching ideas.

E) **Laboratory Write-ups:** Continue to work on your two laboratory write-ups. View and comment on the write-ups posted by other participants.

F) **Teaching Calendar:** One of the biggest questions teachers have is "How am I going to teach all of this material in the time that I have?" The solution *begins* with creating a teaching calendar that shows how much time you can spend on each topic. Read the

lecture material, study the sample class syllabi in the College Board Workshop materials, and the example teaching calendar posted. Begin to develop a teaching calendar for your own course. This will be due during week 5 and will be worth 15 points.

Week 5: Oxidation-Reduction

Readings: see online assignment page

A) **Resources:** Read the lecture materials about organizing these topics and a few of my favorite teaching ideas and resources. Post your ideas, comments, suggestions, and questions in the four "Week 5 Resources" discussion forum. (worth 5 points)

B) **List of Resources:** Read the lecture materials, survey the lists of resources in the Discussion Forums, and examine the example List of Resources displayed. Create your own List of Resources for this topic that fits your teaching style, your students' learning styles, and your teaching situation. Send me a copy of your list using the Assignment at the end of the Week 5 lecture materials. (worth 5 points)

C) **AP Problems:** Try the assigned problems and examine the solutions. Think about what tricks are being added to your bag of tricks. Post your comments and questions in "Week 5 AP Problems" discussion forum. (worth 5 points)

D) **List of Ideas:** Send me your list of 25 teaching ideas during "Week 5". (worth 25 points)

E) **Laboratory Write-ups:** Finish your two laboratory write-ups. View and comment on the write-ups posted by other participants.

F) **Teaching Calendar:** Send me your teaching calendar during "Week 5". (worth 15 points)

Grading:

Each assignment is graded on a point system. Teacher participants will be given a chance to edit and resubmit one of the assignments. The grading scale is: A (90%-100%), B (78% - 89.9%), C (66% - 77.9%), D (50% - 65.9%), F (<50%).

Week 1 – Introduction to the Format and Grading of the AP Exam

Autobiography/Introduction..... 5 points
Exam Format Handout..... 5 points
Exam Grading..... 10 points
Collecting Questions..... 5 points

Week 2 – Atomic Structure and Bonding

Discussion of Resources ..... 5 points
List of Resources..... 5 points
AP Problems..... 5 points

Week 3 – Predicting Reactions

Discussion of Resources ..... 5 points
List of Resources..... 5 points
AP Problems..... 5 points

Week 4 – Equilibrium

Discussion of Resources ..... 5 points

List of Resources ..... 5 points
AP Problems ..... 5 points

Week 5 – Oxidation-Reduction

Discussion of Resources ..... 5 points
List of Resources ..... 5 points
AP Problems ..... 5 points

Final Assignments

List of 25 Ideas ..... 25 points
Two Laboratory Write-Ups ..... 20 points
Teaching Calendar ..... 15 points

Total Possible ..... 145 points

Grading Rubric:

As a generalized rubric, each assignment will be assessed according to three categories:

Completeness (1 point)

All aspects of the assignment are addressed. Read over the assignment before submitting it to make certain you haven't left anything out.

Usefulness (2 points)

Enough thought and detail are included to make the assignment useful to you and to others. Use complete thoughts rather than key words or incomplete ideas.

Clarity (2 points)

The assignment is written in a clear style that can be easily understood by others. This will help make the assignment easily understood by you when you read it again later.