

# Santa Clara University

## Department of Chemistry

### Lecture Syllabus

#### Chemistry 11H General Chemistry I Honors Section 60235 Fall 2010

**Instructor** Patrick E. Hoggard  
Office: DS 111  
Office Hours: MWF 11:00-12:00 PM  
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**Class Meetings** 1:00-2:05 MWF (Lecture), Daly Science 106  
2:15-5:05 M (Lab), Daly Science 124

#### Textbook and Other Readings

- *Chemistry: The Central Science*, 11<sup>th</sup> Edition, by T. Brown, G. LeMay, B. Bursten, and C. Murphy (Prentice-Hall, 2009). In the bookstore new books are shrink-wrapped with the solutions manual to the exercises marked in red in the text (mostly odd-numbered problems) and with an access code to *Mastering Chemistry*, which you will need.
- Recommended for source material is Vol. 14, No. 1 of *Skeptic* magazine, devoted to Global Warming. You can order a copy for \$11 at [www.skeptic.com/the\\_magazine](http://www.skeptic.com/the_magazine). (underline after 'the'). Or you can view the table of contents at the website and order individual articles for free through interlibrary loan (<http://oscar.scu.edu/screens/ill.html>).

#### How 11H will work

The required subject matter for Chem 11 consists of the first nine chapters of Brown, LeMay, Bursten, and Murphy (BLBM). Aside from some related material that is not in the textbook near the end of the quarter, which you certainly were not exposed to in high school, most of this will be review for you, and for most of the quarter we will operate in "review mode" rather than "lecture mode". In addition, we will devote at least a third of

the course to a theme, which is “Chemistry in the Post-Petroleum Age”. In a seminar/discussion format we will work through topics both current (Is global warming taking place?) and future (When will our oil run out, and how do we do chemistry without it?). Fridays will be reserved for these discussion sections. Mondays and Wednesdays we will devote to reviewing the subject matter of Chem 11. The topics for each week are listed below. Typically, we will begin with an assessment quiz on Monday, so you can see how much work you will need to put in on that particular topic. The rest of Monday and the first part of Wednesday, I will do problems, answer questions, and try to point you to the resources you can use to bring yourself up to speed. During the last half hour on Wednesday the “real” quiz will be administered. Note that you do not have to wait until the assessment quiz on Monday to begin reviewing.

### Schedule of Topics for Monday/Wednesday Class Meetings

Dates	Topic	Reading in BLBM
Sep 20/22	Chemical names and formulas	2.6 – 2.9
Sep 27/29	Moles and empirical formulas	3.1 – 3.5
Oct 4/6	Calculations from chemical equations	3.6 – 3.7
Oct 11/13	Concentrations, acids & bases, net ionic eqns	4.1-4.3, 4.5, 4.6
Oct 18/20	Balancing chemical equations	4.4, 20.1, 20.2
Oct 25/27	Enthalpy	5.1 – 5.7
Nov 1/3	Lewis structures	8.1 – 8.8
Nov 8/10	Molecular geometry	9.1 – 9.6
Nov 15/17	Molecular symmetry	handout
Nov 29/Dec 1	Molecular orbitals	9.7,9.8, review Chapt 6

### Homework

There are no graded homework assignments. Nevertheless, a homework assignment will be posted online for each week’s activities on *Mastering Chemistry* (see below). These assignments are optional but highly recommended. They consist of several kinds of questions: tutorial problems that provide hints for wrong answers, end-of-chapter problems, and additional problems supplied by me.

### *Mastering Chemistry*

Online assignments will be posted on the website [www.masteringchemistry.com](http://www.masteringchemistry.com). To access course materials, you will need an access code and the ID for our course, which is MCHOGGARD70917. If you did not buy the bundled textbook from the bookstore, you will need to purchase access, either at the bookstore or at the website, at a cost of \$50. You will need to register for the course (MCHOGGARD70917) after signing on. Once

you are on the course website, you will have access to the weekly assignments, which you should answer online in order to get feedback on your answer. The website also has (among the buttons on the left side of the screen) access to the E-Book, an electronic copy of BLBM, and the Study Area, which has additional practice problems, quizzes, exams, video demonstrations, and links to further information on topics covered.

You can probably find your way through the registration process intuitively, but if you want detailed instructions, you can find them on the course ERes site (see below), both as written instructions and as a PowerPoint presentation.

### **Friday Class Meetings**

Fridays will be devoted to the “Chemistry in the Post-Petroleum Age” theme. Each week will center around a particular discussion topic, except that during the first two sessions we will view the film “An Inconvenient Truth”. The purpose of the discussion sections will be to find and evaluate the scientific evidence for and against the proposition of the week. Class members will be divided into four groups and one group will be in charge of the initial presentation at each session (a schedule of assignments will be circulated during week 2). Other groups are encouraged to make “minipresentations” as follow-up. We will not have a fixed schedule of topics in order to allow the discussions in class on occasion to stimulate new discussion topics. To begin with, however, we will try to follow the schedule below:

Sep 24	An Inconvenient Truth, Part I
Oct 1	An Inconvenient Truth, Part II
Oct 8	Is the earth getting warmer?
Oct 10	Is human activity causing the earth to get warmer?

Additional topics that may be scheduled, depending on progress during discussions:

When will petroleum run out? (How long will the Petroleum Age last?)  
What strategies will work best to extend the time before petroleum runs out?  
What will we do for fuel in the year 10,000 AD?  
How will chemicals, including pharmaceuticals, be made in 10,000 AD?

The Friday discussion sections will be structured something like this: The lead group will make its presentation, which should be between 20 and 25 minutes in length. Most groups will want to use Powerpoint, but you may also (or instead) use overhead transparencies, and, of course, the board. Questions from the class will follow. Minipresentations will then follow, and should be 5 to 10 minutes long. A minipresentation should address a topic you think will not be covered in the lead presentation, or only glossed over. This can present some problems, because you may have no information at all about the lead presentation until you actually see it. Lead presenters may make an outline available in advance to students who ask for it, but this

isn't required. If your "mini" is covered in detail by the lead presenters, it will be better to just pass and wait for another chance. A good way to increase the chances that your mini will not overlap is to present the evidence for a "contrarian" point of view. Another strategy is to pick a narrow subtopic and amplify.

Each group will be assigned two lead presentations. Groups will also be expected to make three minipresentations during the quarter. 50% of the discussion grade will derive from the lead presentations, 30% from the minipresentations, and 20% from questions. I will keep track of who asks questions. You must ask at least one, so you might want to prepare, at least once.

Finally, this is a chemistry class. It is very easy and usually necessary, given our general topic, to delve into many other disciplines: meteorology, geology, history, economics, political science, etc. But try to bring the discussion back to chemistry whenever you can. You should, at the very least, be sure to include at least one (balanced) chemical equation in every presentation you make (point deduction otherwise).

## **The Scientific Method**

In today's world, all of these discussion topics have heavy political connotations, as exemplified by our introductory film, produced by a former presidential candidate. But the purpose of the discussions is not to make political arguments. It is to learn how to find and evaluate scientific evidence. It is also to consider the questions of what constitutes scientific evidence, how strong is a given piece of evidence, and how much evidence is enough. Although some scientific propositions can be proved (e.g., the earth is round), many, by their very nature, cannot. The scientific method consists of inventing and carrying out experiments that could *disprove* a hypothesis, because many hypotheses can be disproved by a single counterexample. A hypothesis that has survived several experiments that might have disproved it has accumulated evidence in its favor. At some point, individuals are apt to conclude that the hypothesis is more likely to be true than to be false, but not everyone will form that conclusion at the same time. For example, the Big Bang Hypothesis, stating that the universe is expanding from an initial, very small state many billions of years ago, competed with another hypothesis in the middle of the 20<sup>th</sup> century, the Steady State Hypothesis, proposing an infinitely old universe in which new matter was created spontaneously so that the density of the expanding universe was constant. The Steady State model fell victim to experiments (for example, on the ratio of hydrogen to deuterium in the universe) with which it was inconsistent, while the Big Bang model survives. Most scientists accept the Big Bang hypothesis, knowing that it hasn't been proved, can't be proved, and could founder tomorrow if new scientific evidence turns up.

## **"Safe Zone"**

Because the scientific issues we want to consider have strong political overtones, we can assume that members of the class will not have congruent opinions on them. In fact, it is to be hoped that we are not all of the same mind, because it is often hard, for scientists as well as nonscientists, to step outside one's frame of reference to formulate the questions and look for experiments that might disprove a particular hypothesis. In our discussions it is very important that students not feel intimidated by the majority to the point of failing to express opinions. Therefore we have to agree to a few ground rules, among which are

1. We will not only tolerate but encourage opinions other than our own.
2. It is important to avoid simply contradicting a particular opinion as being stupid, or because "everyone knows" the opposite. An appropriate way to disagree is to ask, "What is the evidence for that?" This takes the discussion a step further and also allows both sides to take the necessary time to search for evidence and present it at the next discussion section. Do not be surprised if both sides can find evidence that supports their positions.
3. We will assume, unless hit over the head by evidence to the contrary, that everyone in the class, no matter the political persuasion, does want to do what is right for future generations. "I don't plan on having kids, so I don't care if we use up all the earth's natural resources in one generation as long as gas is cheap" is, thankfully, a rare point of view.
4. If the discussion turns away from the scientific toward the political, we will try to restore direction by asking what questions might best be looked at in scientific terms.

### **Additional Supplies**

1. You will need a calculator to do homework and take exams. You may need to buy a new one, because the fancy one you got for graduation that can store 100 formulas is *not allowed on exams*. **Only simple calculators with no alphanumeric storage or programmability are allowed on exams.** A TI-30X at around \$15, is a good choice, but there are many others.
2. A bound notebook is required for the laboratory. The ones approved for this class (96 page, quadrille ruled) are available at the bookstore on the Chem 11H shelf (*don't* buy a Chem 11 notebook).
3. **SAFETY GOGGLES** are an **ABSOLUTE REQUIREMENT** for all laboratory work. Impact safety goggles are not good enough. They must be splash goggles, that is, they must make a full seal around the eyes. Splash goggles are available from the bookstore, but I recommend the goggles offered by the Chemistry Club, on sale during the first week of lab at the stockroom. You may want to consider wearing a lab coat or apron when working in the lab, especially if you have more labs in your future. The Chemistry Club may take orders for lab coats during the first week. They take about two weeks to arrive.

## ERes

ERes (electronic reserves) provides online access to additional class materials, beyond those posted on the Mastering Chemistry site. You can access ERes at [eres.scu.edu](http://eres.scu.edu), or go directly to <http://eres.scu.edu/eres/coursepage.aspx?cid=4960>. Grades will also be posted on the ERes page, unless you choose not to have yours displayed. You can sign up to be informed whenever I make a new posting to the site by clicking on the Course Info tab, then on the Email Alerts link.

## Grading

Your performance in this class will be based on the following schedule of points.

10 quizzes (drop lowest 2)	400
final exam	300
lab	150
Fri team/indiv performance	150
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total	1000

**Final Exam:** Wednesday, Dec 8, 1:30-4:30, cumulative.

## Extra Credit

*There will be no extra credit to improve individual grades.* Doing extra work is encouraged, and normally does improve your test scores, but writing a term paper or mowing my lawn are not available as options to enhance your point total.

## Missed Quizzes

Your two lowest quiz scores will be dropped. If you miss a quiz because of illness, an athletic event, or any other reason, it will automatically be dropped as one of your two lowest scores. Keep in mind, though, that the final will cover all ten topics.

## College of Arts and Sciences Performance Standards in the Sciences

This course is a prerequisite for Chemistry 12 (General Chemistry II). In order to be eligible to continue in the General Chemistry sequence, you must complete Chemistry 11 or 11H **with a grade of C- or better**. If you do not achieve a C- (this is extremely rare in Chem 11H or 12H but I'm required to let you know about it), it is your responsibility not

to enroll in Chemistry 12, or to withdraw if you have pre-enrolled. Otherwise you are subject to Administrative Withdrawal on the first day of class.

### **Disability Accommodation Policy**

To request academic accommodations for a disability, students must contact Disability Resources located in The Drahmann Center in Benson, room 214, (408) 554-4111; TTY (408) 554-5445. Students must provide documentation of a disability to Disability Resources prior to receiving accommodations.

### **Academic Dishonesty**

Most students are scrupulously honest about academic matters, and would not even consider cheating on a test. But they obviously do not want to be taken advantage of by students who do. Santa Clara University and the Department of Chemistry consider academic dishonesty, including (but not limited to) copying or allowing another student to copy during tests, use of unauthorized materials (such as lecture notes, crib sheets, textbook) during exams, copying lab reports from other students, or recording laboratory data that was not actually observed (dry labbing) to be a very serious infraction of the rules of conduct. Penalties for incidents of academic dishonesty range from taking a zero on the exam or assignment in question to receiving an F for the entire course. Incidents may also be reported to the University Discipline Council, and further action taken. Please consult Section IV of the *Undergraduate Student Handbook* under the heading Student Conduct Code for a more complete discussion of standards of academic conduct.

## **Your Classmates**

The initial roster is shown below.

Agrawal, Nikita  
Albi, Emily Marie  
Barth, John Thomas  
Beasley, Madeleine Sara  
Bird, John Ireland  
Borofka, Kristian Grace  
Brown, Laura-Marie Frances  
Cauvel, Teresa Nicole  
Chandler, Bryan Gregory  
Coletto, Dennis  
Doshi, Pankti  
Flagg, Lucas Quinn  
Germany, Lauren  
Kunkle, Claire Marie  
Lays, Natalie Lynn  
Nam, Andrew  
Neill, Patrick Ryan  
Panditrao, Shweta C  
Sibole, Alexandra Mara  
Stroud, Gina Marie  
Torosian, Kelly Jean  
Tran, Juliane Hanh-An  
Ventoza, Daniel Fernando  
Vinopal, Mark Andrew