CHE 107: Principles of Chemistry (Syllabus subject to change by instructor)
Fall 2010
Lecture: M T W F 12:30-1:20 am, NHS 201

Instructor
Dr. Steve Miller
Office: NHS 107B
Office Hours: M W 11:00-12:00 or by appointment
While I will be available at these times each week, I am also happy to meet with students at other times. If you would like to see me outside of my office hours, it would generally be best to contact me in advance to arrange a time. You are also welcome to stop by my office, but be aware that I may not be there or I may be unable to see you if I am occupied with other obligations.
Phone: x7321
Email: smiller3@gustavus.edu

Catalogue Description
The fundamental concepts of chemistry, including the atom; periodicity; stoichiometry; properties of gases, liquids, and solutions; acids and bases; chemical energetics; and bonding. Laboratory work is coordinated with lecture and is intended to illustrate principles and develop experimental skills.

Required Materials
Lab manual: Gustavus Adolphus College, General Chemistry Laboratory Manual (available only through the campus bookstore)

Course Goals
1) Learning the basic language and principles of chemistry
2) Understanding the prevalence of chemistry (and science in general) in modern society
3) Fostering critical thinking, and learning to apply it to problem solving

My Approach (aka Just So We Understand One Another)
The third course goal listed above is one which I am going to pound through the semester, like a sledge hammer on an unlucky nail (I exaggerate—but only slightly). The most important thing to remember is that chemistry (and more generally science) is a process, not a collection of facts. A person can have an encyclopedic knowledge of chemistry, but that does not automatically make him/her a good chemist. Conversely, a person with limited knowledge of chemical facts might be a very good chemist.
If all goes well this semester, you should end up being a better chemist, not just knowing some chemistry. With this in mind, I would define our respective roles in this course as follows:

*My role:* present you with the language and tools that chemists use to understand chemical problems

*Not my role:* fill your head with a bunch of random (but hopefully interesting) chemistry facts

*Your role:* understand how the language and tools used by chemists can be applied to studying chemical systems, so that you can begin to probe the unknown

*Not your role:* become little more than a portable chemistry trivia device

To help reinforce this philosophy, several Big Picture Days (or BPDs) are scattered throughout the semester (see the attached schedule). The purpose of these days will be to take some of the chemical knowledge you have recently learned and apply it to a problem which you may not have seen/thought about before. The point will be for you to take a scientific approach to the problem; that is, you will work with your classmates, consult your book/notes, etc., and/or by any other (honest) means available try to come up with an answer to a previously unseen question. Hopefully, these problems will be challenging (but solvable), informative, and enjoyable, in much the same way a puzzle can be. Your answers will not be graded, but becoming comfortable with the process of problem solving will undoubtedly help you come exam time (and hopefully in your other courses and life as a whole).

**Attendance**

I do not take attendance for lecture. However, attending every lecture is strongly encouraged. If you miss a lecture, you are responsible for getting the information and/or notes covered in class from a classmate—I will not provide it for you. Moreover, you will probably find that what is said during lecture is no less important than what is written in your notes, and there is no reliable way to hear what is said without being in class and paying attention. Laboratory attendance is required every week. If you must miss a laboratory meeting, please inform your lab instructor as soon as possible to discuss make up options. Attendance at scheduled peer mentoring sessions (see below) is also mandatory.

**Grading**

Final grades will be assigned according to the following scheme:

- HW: 20%
- Midterm Exams: 30%
- Lab: 30%
- Final Exam: 20%

The maximum percentage for final grades will be 88% (A-), 76% (B-), 62% (C-), 55% (D), <55% (F). In other words, if you earn a grade of 91% for the semester, you are guaranteed an A/A-; if you earn 87%, you are guaranteed at least a B; with the final cutoffs your grade
may be bumped up to an A/A- (the actual percentage cutoffs will be determined only after the final exam).

[Note: different items may not be worth the same number of points (e.g. one assignment may be worth 25 points and another 47 points). However, I do all of my grading based on percentages, so 80% on a 25 point assignment affects your overall grade exactly the same as 80% on a 47 point assignment.]

A closer examination of the grade contributions shows that fully half of your grade is based on homework and lab. These are the parts of the course that will best teach you the process of chemistry and science. Doing the homework/lab work is the only way to learn their lessons; because they contribute so much to your overall grade, you will not succeed in this course without doing them. However, if you do the homework/lab work without learning their lessons, you will not do well on the exams and will still have difficulty succeeding in the course. The only way to truly be successful in this course is by doing the work AND understanding what it means.

**Exams**

There will be three midterm exams given in class on the dates included in the attached schedule. You are expected to take each exam in class on the day it is given. If you know ahead of time that you will be unable to do so, you may arrange another time to take a make-up exam. If you are unable to take your exam because of a last minute problem (e.g. illness), you must contact me as early as possible (preferably before the exam). Make up exams in such instances will be allowed at my discretion depending on the reason for the missed exam. Be forewarned: make up exams may contain different (probably harder) questions than the exam given in class; it will therefore not be beneficial to you to see the exam given in class before taking a make up exam. Exams will be meant to require the full 50 minute class period, and will contain some combination of multiple choice, true/false, matching, short answer and word problems. I may also elect not to allow the use of calculators on exams.

You may write in either pen or pencil on exams. However, I will not regrade any problems on an exam which is written in pencil, erasable pen, or pen which has been whited out. (If I make an adding mistake when totaling an exam grade, I will fix it whether the exam was written in pen or pencil.)

**HW**

Eight homework assignments will be given during the semester. Due dates for assignments are given in the attached schedule. Assignments due on class days will be due at the beginning of class, and those due on Thursdays will be due by 1:00 pm. Late assignments will not be accepted under any circumstances (this includes showing up for class late; I will not accept any assignment turned after class has begun). You will be allowed to drop your lowest homework score.
**Laboratory**
Each student must attend every lab session and complete all of the required laboratory assignments in order to pass the course as a whole (see the lab manual and/or talk to your lab instructor for details). In addition, lab contributes 30% to your overall course grade. The laboratory portion of the course is designed to apply chemical theory to real problems. Details about lab grades, expectations, make up conditions, etc. will be presented during your first lab meeting (labs begin the week of September 13). Please note that your lab and lecture instructors will be different; if you ever have questions about the lab portion of the course, please direct them to your lab instructor.

If you need to make up a lab, you can go to the Moodle site for your lab section to find a make up form. You must complete and submit the form, after which you will be contacted about your make up lab time.

**Final Exam**
All students must take the final exam at the time/place (10:30-12:30 on Friday, Dec. 17 in NHS 201) mandated by the college. The policy for the two hour long final exam will be the same as that used for the midterm exams.

**Peer Mentoring**
To help you develop strong learning skills in the natural sciences and to better understand the ethos of scientific inquiry, all students in BIO 101 and/or CHE 107 will participate in a Peer Mentoring program. This program is funded with a grant to the College from the Howard Hughes Medical Institute (HHMI).

Each week, you will meet with a small group of other students enrolled in BIO 101 and/or CHE 107, which is led by a talented junior or senior biology, chemistry or biochemistry major. At these peer mentoring sessions, you will discuss learning strategies and participate in activities that help reinforce course content. One goal is to help you be more successful in biology, chemistry, and other coursework.

You are required to sign up for a peer-mentoring group in the Peer Mentoring Center, Room 121, Nobel Hall of Science (NHS) on Wednesday, Sept 8th or Thursday, Sept 9th between 4:30 and 7:30 pm. If you are enrolled in either BIO 101 Principles of Biology or CHE 107 General Chemistry, you will sign up for a group that will focus solely on that class. If you are enrolled in both BIO 101 and CHE 107, you will sign up for a group that does activities that relate to both courses. Please bring your class and event schedule so you can choose the best time for you and your lifestyle. Peer mentors will be available to answer your questions during that time.

You will meet with your group and peer mentor once a week in the Peer Mentoring Center, Nobel 121 or Nobel 222. Bring a notebook and a pen/pencil to your weekly peer mentoring session. You will not be allowed to use electronic devices of any kind (including phones,
iPods, Blackberries, personal electronic devices, etc) during your peer mentoring session. Ten formal sessions are planned for the weeks of Sept. 13, 20, 27, Oct. 11, 18, Nov. 1, 8, 15, 29, and Dec. 6. There will be no formal peer mentoring sessions during the weeks of the Nobel Conference (Oct. 3), Reading Break (Oct. 27) and Thanksgiving (Nov. 22); however, there will be open, voluntary forums during Nobel and Reading Break weeks. A list of the Peer Mentoring activities for the whole semester is on your course Moodle site. If you do not attend and actively participate in eight of 10 peer mentoring sessions, you will lose up to 5% of your final course grade.

If you have any questions or concerns about the HHMI peer mentoring program, please contact Pamela Kittelson, HHMI Peer Mentoring Coordinator at pkittels@gustavus.edu.

**General Expectations**
1) I will try to treat every student with respect. In return, I expect each student to treat me and all of his/her fellow students with respect. This includes not talking during class or when others are speaking.
2) My biggest pet peeve as a teacher is the improper use of digital devices. Phones, MP3 players/iPods, etc. should be turned off—not just set to silent or vibrate (the temptation to text your friend sitting next to you will simply be too great…)—and put away during class. If I see or hear it, I may just take it away so no one can be distracted by it again...
3) I expect you to be honest, as per the personal code of conduct each GAC student is required to sign when registering for classes. If you have any questions/concerns about the propriety of a particular aspect of working with your fellow students, please do not hesitate to discuss it with me. Academic dishonesty will not be tolerated under any circumstances. Anyone caught cheating will receive an automatic grade of zero for the assignment/lab/exam in question. A second offence will result in the student’s immediate removal from the course, an automatic F grade for the course, and referral to the dean of students.
4) If you ever have questions, ask! If I cannot answer them myself, I will try to point you to someone who can.

**Tips for Success**
1) **Introduce yourself**—to me and your fellow classmates. I like to get to know each and every student in my classes, and I hope that you will feel comfortable approaching me with questions you may have. An initial introduction helps to achieve both ends. You might also meet fellow students with whom you can form study groups among your classmates.
2) **Do not wait until the night before an exam to study.** Suffice it to say that it won’t work.
3) **Do the homework.** The homework assignments are meant to help you keep pace with the lecture material and avoid falling behind. In addition, doing the homework should be a reliable way of boosting your course grade.
4) **When reading the textbook, re-read any passages which you do not understand.** If you see a word you do not know, look it up in a dictionary. It can also very helpful to write a summary of material you have just finished reading.

5) **Take good notes.** Chemistry is a difficult course to study for without the guidance of a good set of notes.

6) **Come in for help if/when you need to.** I try to be available as much as possible, and do not mind lending a helping hand!

**Additional Resources**

I will post lots of things on the class website over the course of the semester:

homepages.gac.edu/~smiller3/courses/107-f10.htm

If you are ever looking for information check there first, and let me know if you cannot find what you need.

*Disability Services:* Any student who has a physical, psychiatric/emotional, medical, learning, or attentional disability that may have an effect on the his/her ability to complete assigned course work should contact the Disability Services Coordinator (Laurie Bickett, lbickett@gustavus.edu or x6286) in the Advising Center, who will review the concerns and decide with the student what accommodations are necessary.

*Help for students whose first language is not English:* The Writing Center has a part-time tutor with professional training in ESL/ELL instruction on staff. Students can schedule work with this tutor by contacting the Writing Center. Students may bring their instructors documentation concerning their ELL status.
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<td>9/6 No class (Labor Day)</td>
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<td>9/7 Class introduction §1.2 (What is science?)</td>
<td>9/8 §1.3-1.5 (Matter and measurements)</td>
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<td>9/13 §2.1-2.4 (Atoms)</td>
<td>9/14 §2.5-2.7 (Molecules)</td>
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<td>9/17 BPD1: Chemistry and...Legos?</td>
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<td>9/21 §4.1-4.5, 3.7</td>
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<td>9/27 §3.8-3.10 (Stoichiometry)</td>
<td>9/28 § 4.6 (Solution stoichiometry)</td>
<td>9/29 BPD2: You made HOW much of WHAT?</td>
<td>9/30 HW 2 Due</td>
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<td>10/4 Ch. 5 (Gases)</td>
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<td>10/12 § 6.1-6.3, 18.1 (Intro to thermodynamics)</td>
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<td>10/26 No class (Reading Days)</td>
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<td>11/2 Ch. 8 (Periodic table)</td>
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<td>BPD5: NOW Chapter 2 makes sense...</td>
<td>§12.1-12.3 (IM forces and liquids)</td>
<td>§ 12.4-12.7 (Solids and phase changes)</td>
<td>Chapter 13 (Solutions)</td>
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<td>Chapter 13 (Solutions)</td>
<td>HW 6 Due Exam 3</td>
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<td>Ch. 15 and § 18.6 (Equilibrium)</td>
<td>§ 14.1-14.3 (Reaction rates)</td>
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<td>BPD6: Cage match—Kinetics vs. Thermo</td>
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<td>HW 7 Due</td>
<td>§ 16.5-16.7 (Acid/Base equilibrium constants)</td>
<td>§ 16.8-16.11 (Acid/Base properties)</td>
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<td>§ 17.2-17.4 (Buffers and acid/base equilibria)</td>
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<td>§ 17.5-17.7 (Solubility equilibria)</td>
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