

# CHM 1020 - GENERAL CHEMISTRY II

Professor Sinex

Course Website: <http://academic.pgcc.edu/~ssinex/chm102.html>

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REQUIRED ITEMS: Silberberg, *Principles of General Chemistry*, McGraw-Hill, 1<sup>st</sup> edition, 2007 (old text McMurry & Fay works too)  
TI-83/84, TI-83 Plus, or TI-84 Plus graphing calculator  
Package of graph paper (**at least 10 squares per inch**)  
30 cm ruler  
3-5 different colored pencils

GRADING:	4 HOUR EXAMS (100 points)	400 points
	10-12 HOMEWORK ASSIGNMENTS (5 pts each)	50
	DATA ANALYSIS AND MODELING PROJECTS (See last page - 6 at 25 points each)	150
	COMPREHENSIVE FINAL EXAM (required)	<u>200</u>
	<b>TOTAL</b>	<b>800</b>

*This course involves the principles and concepts of kinetics (how fast?), chemical equilibrium (acid-base and others), thermodynamics (will the reaction happen?), and nuclear chemistry. Many of these topics will be applied to practical applications. You will also learn how to use the graphing calculator and STELLA Modeling software as a tool to analyze data in the course.*

## EXPECTED COURSE OUTCOMES:

Upon successful completion of this course a student will be able to:

- use scientific tools for data processing, display, and evaluation such as the graphing calculator, spreadsheets, and other software;
- formulate rate laws for chemical reactions using experimental data, and explain the factors that influence the rate of chemical reactions;
- characterize the nature of equilibrium systems, using experimental data and graphical analysis, and explain the factors that influence a chemical system at equilibrium;
- explain and analyze thermodynamic variables in physical and chemical systems, and predict reaction spontaneity;

- characterize the nature of electrochemical reactions and employ standard electrode potentials, and explain oxidation, reduction, ionic conductivity, and conditions that influence electrochemical reactions;
- construct the connection between the equilibrium constant, free energy, and the electrode potential for chemical systems and perform calculations that relate these parameters; and,
- characterize the nature and behavior of radioactive elements and their decay, and utilize kinetics to compute decay rates.

Exams will consist of questions and problems on material covered in class. Old exam samples will be posted on the course web page. You are required to have a graphing calculator for all exams. Take-home components may be part of the hour exams. They would be distributed on Wednesday before an exam and due at the exam on Friday. If you miss getting the take-home, you miss getting the take-home! **A two-hour comprehensive final exam is required to be taken at the end of the course.**

A general make-up exam for any hour exam which is missed will be given during the final week of classes. This exam may be taken by anyone and used in place of your lowest grade. There are NO other make-up exams given!

Homework is DUE at the beginning of the next class meeting after being assigned. NO late versions will be accepted. Late projects will be penalized at a loss of 10 points. You start with a "D" if late.

### **Ground Rules for Success in CHM 1020:**

1. *Attendance* in class is very highly recommended! Lack of attendance is a great way to fail this class. Many activities are done in-class where help will be easy to get. This class is like a team sport -- all members must participate.
2. *Being on time to class* is absolutely necessary. Coming in late is inconsiderate to the students who got here on time.
3. *Be prepared* for class! There will be many times when class ends with a simple task for you to do. Do the problem assignments at the end of each topic (they will be many of the homework assignments).

4. Out-of-class *STUDYING* time is at least *3 times* the amount of in-class time! So figure on about 10 hours of out-of-class work. Forming a study group is highly recommended. Study and review notes and/or handouts *as soon as possible* after class.
5. This class requires you to *THINK*. We are aiming for the conceptual understanding of topics. Memorization is *NOT* going to get you through the class nor is simply doing problem after problem.
6. We will use many topics from *CHM 101* (some are reviewed at the beginning of this class). You are responsible for the content typically covered in that class.
7. A good rule of thumb - don't wait until the last minute to do an assignment or prepare for an exam.
8. Be considerate to other members of the class and don't be disruptive. You are responsible for knowing the Code of Conduct in the Student Handbook. See - <http://www.pgcc.edu/students.html>.

**TURN-OFF cell phones or set to vibrate!**

9. During exams graphing calculators may **not** be passed to another person, and you may **not** leave the room. If you leave, your exam is over.

10.

**CHEATING and PLAGARISM will NOT be tolerated**  
and the greatest possible penalty will be applied.  
See Academic Integrity as part of the  
Student Code of Conduct

#### **Where to Get Help:**

1. See me during office hours, or call for appointment at other times.
2. Visit the Tutoring Center (call for appointments - 301-322-0748) in Bladen Hall Room 107 (other student services - call 301-322-0886).
3. Computer lab (CH-309) hours are posted. See other open labs for hours.
4. Many great student support items can be found on the Physical Sciences and Engineering Department webpage - <http://academic.pgcc.edu/psc>

Fall 2009

## CHM 1020 Tentative Classroom Schedule

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Week	Date	Monday	Wednesday	Friday
1	8/31, 9/2, 4	Introduction/Gases (3, 4, 5.6)*	Molecules in a Box	Modeling with the Graphing Calculator & Excel
2	9/7, 9, 11	Labor Day - No class	Modeling with STELLA - Dissolved Oxygen	Kinetics with STELLA (16)
3	9/14, 16, 18	Kinetics	Kinetics	Kinetics
4	9/21, 23, 25	Chemical Equilibrium (17)	Chemical Equilibrium	Chemical Equilibrium
5	9/28, 30, 10/2	Chemical Equilibrium	Competing/Consecutive Reactions (CH-309)#	<b>EXAM I</b>
6	10/5, 7, 9	Acids, Bases, & pH (18) via TI-83/84	Acid-Base Equilibria (18)	Acid-Base Equilibria
7	10/12, 14, 16	Buffers (19)	Buffers	Hydrolysis (18)
8	10/19, 21, 23	Discovering Titration Curves via TI-83/84 (19)	More Titration Curves and Indicators	<b>EXAM II</b>
9	10/26, 28, 30	Solubility Product (19)	Complex Ions (19)	Molecules in Motion (CH-309)
10	11/2,4,6	Thermodynamics (6, 20)	Thermodynamics	Thermodynamics
11	11/9, 11, 13	Thermodynamics	Electrochemistry (21)	<b>EXAM III</b>
12	11/16, 18, 20	Electrochemistry	Electrochemistry	Electrochemistry**
13	11/23, 25, 27	Electrochemistry	Thanksgiving - No class	Thanksgiving - No class
14	11/30, 12/2, 4	Nuclear Chemistry (23)	Nuclear Chemistry	<b>EXAM IV</b>
15	12/7, 9, 11	Nuclear Chemistry	Nuclear Chemistry	<b>FINAL EXAM</b> (11am - 1:30pm)

\*Chapter in Silberberg

#Computer lab in Chesapeake Hall room 309

\*\*last day to withdraw (actually 11/20)

Problem Assignments  
Silberberg

Review	Ch. 3	3.41, 3.43, 3.45, 3.47
	Ch. 5.6	5.58, 5.60
Kinetics	Ch. 16	16.10, 16.12, 16.22, 16.26, 16.31, 16.33, 16.36, 16.42, 16.45, 16.66, 16.69
Chemical Equilibrium	Ch. 17	17.11, 17.13, 17.15, 17.18, 17.30, 17.32, 17.40, 17.42, 17.47, 17.51, 17.53, 17.57, 17.62
Acid-Base Equilibria	Ch. 18	18.9, 18.28, 18.30, 18.32, 18.43, 18.45, 18.47, 18.58, 18.60
pH	Ch. 18	18.15, 18.16, 18.18
Buffers	Ch. 19	19.2, 19.9, 19.11, 19.15, 19.21, 19.95
Hydrolysis	Ch. 18	18.77, 18.79, 18.82(b), 18.64(a)
Titration Curves	Ch. 19	19.26, 19.28, 19.33
Solubility Product	Ch. 19	19.46, 19.48, 19.50, 19.52
Complex Ions	Ch. 19	19.63, 19.65, 19.70
Thermodynamics	Ch. 6	6.42, 6.44, 6.51,
	Ch. 20	20.12, 20.14, 20.18, 20.27, 20.39, 20.45, 20.47, 20.51, 20.67
Electrochemistry	Ch. 21	21.13, 21.20, 21.25, 21.35, 21.39, 21.53, 21.78, 21.80,
Nuclear Chemistry	Ch. 23	23.6, 23.8, 23.10, 23.12, 23.22, 23.24, 23.33, 23.50,

### DATA ANALYSIS AND MODELING PROJECTS

These projects, provided as handouts, will be given out in-class but will require out-of-class time to complete and access to a computer with an Internet connection. The STELLA models can be downloaded at <http://academic.pgcc.edu/~ssinex/chm102.html>. The file will unzip when you click on it after downloading it. Each project is worth 25 points. Late projects will be penalized an automatic loss of 10 points. A perfect late project will get you a D grade (60%). *Hence get them in on time!*

Topic	Project	Technology Required	Due Date (TBA)
CHM 101 Review	Reaction Dynamics: The Energetics	Excel	
Kinetics	Order of Reactions	Computer and STELLA*	
Chemical Equilibria	Exploring Chemical Equilibrium with Stella Simulations	Computer and STELLA	
Acids and Bases	Titration Curves and Derivatives	TI-83/84 and the programs <sup>†</sup> - abtitr.83p & pHderiv.83p	
Thermodynamics	Vapor Pressure and the Heat of Vaporization	TI-83 or Excel	
Nuclear Chemistry	Radioactive Decay Kinetics	Computer and Excel	

<sup>†</sup> TI-83/84 or 83/84-Plus programs will be supplied by your instructor

\*STELLA, actually the ISEE Player, is available in the college open computer labs: CH-309, Bladen Hall or High Tech Center.

Open the academic application folder, then the physical science folder, and then click on the ISEE Player icon. Go to file and select open. (Do not click on IE file icon!!!!)

You can download the free ISEE Player - see link on Physical Sciences and Engineering webpage - <http://academic.pgcc.edu/psc>