Student Course Information

General Chemistry I

CHEM*1040

Fall 2006

Coordinator: Dr. R. J. Balahura, SCIE 3244

1. Required Materials

(a) *General Chemistry*, 8th ed, Darrell Ebbing and Steven Gammon, Houghton Mifflin Company, 2005; *Student Solutions Manual*, David Bookin, Darrell Ebbing, and Steven Gammon, Houghton Mifflin Company, 2005; *Study Guide*, Larry Krannich, Houghton Mifflin Company, 2005. These three books are shrink-wrapped together and may be purchased in the University Bookstore.

(b) Organic Chemistry Notes for CHEM*1040. Purchased in the Department.
Laboratory Manual for CHEM*1040. Purchased in the Department.
Safety goggles (not safety glasses). Purchased in the Department.

(c) Lab coats. Purchased in the Department from the Chemistry & Biochemistry Club.

(d) Indigo Instruments Molecular Model Kit, available in the University Bookstore. This will be useful for the material on molecular shape, and organic chemistry.

(e) Electronic calculator with ln, exp or e^x, $\log_{10}$ and 10^x functions. Calculators or notebook computers capable of storing text information are **NOT** allowed in examinations.

2. "Wet" Laboratory

Laboratories begin on Monday, September 11 (See the schedule on page 6). The laboratory is an integral part of the course and you must attend all the labs.

(a) Laboratory Time
You must attend your first lab in order to receive mandatory safety training. This safety laboratory is a prerequisite for all subsequent labs. As proof that you are registered in the lab, **you must bring a recent computer print-out of "My Class Schedule" from WebAdvisor to your first lab.**

(b) Laboratory Quizzes
The in-lab quizzes count towards your laboratory grade, and will usually be based on the experiment that you are about to perform. See the Laboratory Schedule.

(c) Laboratory Reports
Laboratory reports are due exactly one week after the lab. Submit the report to your demonstrator at the beginning of the next laboratory period.

(d) Laboratory Exemptions for students who are repeating CHEM*1040.
Application must be made before Tuesday, September, 12 by filling in the application form posted near the water fountains and elevators on the second floor of SCIE. Students who obtained a "wet" laboratory grade of at least 60% during one of the three preceding semesters in which the course was offered may apply for a laboratory exemption. Students who are granted a "wet" lab exemption should attend any one of the problems labs in week 6. Please note, students who are granted a "wet" lab exemption **must complete the computer labs**.

3. Course Help

(a) Web Site
The CHEM*1040 web site is an integral part of the course and must be accessed daily. All important announcements will be posted on the web site. The web site can be accessed through the portal at **http://courselink.uoguelph.ca**. Your **User ID** is your Central Login Account ID (that part of your assigned University of Guelph e-mail address before the @ sign) and your **password** is your Central Login Account Password. The first page is **"**myWebCT: your name**"** which will list all your WebCT courses including CHEM*1040.
If you have any problems using WebCT, follow the instructions on the "Courselink@Guelph" page.
If you do not have a Central Login Account, go to **http://www.uoguelph.ca/ccs/accounts/**.

(b) Your professor will be available at certain times for consultation and help. Office hours will be arranged at the first class meeting.

(c) **Lecture Help** in the Chemistry Help Room (MACN 106 in the MACN foyer)
The Lecture Help schedule is posted on the web site.
Laboratory Help in the Chemistry Help Room (MACN 106 in the MACN foyer)
Tuesday, Wednesday and Thursday from 4:00 - 5:00 p.m.

(d) Supported Learning Groups (SLG's)
SLG's are regularly scheduled small group study sessions. Attendance is voluntary and open to all students enrolled in the course. The study groups are facilitated by successful senior students who have recently taken the course. SLG leaders attend all lectures, take notes and work with faculty and staff to create study activities that integrate course content with effective approaches to learning. Students who attend SLG sessions have an opportunity to apply and demonstrate their understanding of course concepts in a peer-supported environment. The group study format exposes students to various approaches to learning, problem-solving, and exam preparation. The session times and locations will be announced during the first week of classes. For more information, go to **http://www.learningcommons.uoguelph.ca/index.html**.

4. Evaluation

(a) The course grade will be calculated as follows:

Online Quizzes (web site)	12%
Computer Labs (web site)	5%
Midterm Examination	25%
Final Examination	38% (scheduled by the registrar)
"Wet" Laboratory & quizzes	20%

(b) **Practice Quizzes** (not for credit)
The online Self-Assessment Quiz is available during Sept. 1-16 and can only be accessed once. Find out what you know!
Practice quizzes are available the entire semester and can be attempted as many times as you wish.

(c) **Online Quizzes for Credit**
You may use the text and any notes when attempting the quizzes. The maximum benefit from the quizzes will be obtained if you do them on your own under examination conditions. The quizzes are 75 minutes in duration, can only be attempted once, and will be available on the dates listed from 7:00 a.m. Tuesday until 11:55 p.m. Thursday. **If a quiz is not attempted, a grade of zero will be assigned.** Please do not leave your quiz attempt until the last day!
Submitted quizzes may be accessed **ONLY** Friday to Monday following each quiz. Use this opportunity to review your quiz, make corrections and solidify your understanding.

Quiz #1 - **Stoichiometry and Reactions**, Sept. 19 - 21
Quiz #2 - **Equilibrium, Acids, and Bases**, Oct. 3 - 5
Quiz #3 - **Salts and Buffers**, Oct. 17 - 19
Quiz #4 - **Titration Curves and Solubility Equilibria**, Oct. 31 - Nov. 2
Quiz #5 - **Atomic and Molecular Structure**, Nov. 14 - 16
Quiz #6 - **Organic Chemistry**, Nov. 28 - 30

(d) **Computer Labs**

Each Computer Lab consist of 2 parts, the Experiment and the Marking Module. Both are accessed on the web site. The Experiment can be done at any time during the assigned dates and can be done as many times as you wish. However, each time you repeat an experiment, you will be assigned a new "unknown" number specific to that experiment. After you are satisfied with your results and have completed all calculations, only then input the results into the Marking Module. Do not open the Marking Module until you have completed your calculations! You may only grade your lab work once. Please follow instructions exactly.

Volumetric Analysis Computer Lab, to be completed in the period Oct. 9 - 17
(Test your understanding of stoichiometric concepts and analysis skills.)
Atomic Spectroscopy Computer Lab, to be completed in the period Nov. 6 - 14
(Explore energy levels in atoms and "fireworks" colours. This experiment is based on EXPT 6 in the CHEM*1040 Laboratory Manual. Refer to the latter for further information and work sheets to record your data.)

(e) **Midterm Examination**

Saturday, October 21, 9:30 - 11:00 a.m. Room assignments will be posted outside all laboratories and on the web site..
Midterm Examination Conflict: please apply in writing, during the week of October 10 only, to write the alternate midterm examination on Thursday, October 19 at 5:30 p.m. Include your name, ID, and reason for conflict and leave the application in the envelope on the door of SCIE 3244. If you are not contacted by Tues., Oct 17, your application to write the alternate midterm has been approved. The location of the alternate midterm examination will be announced by your lecturer and posted on the web site.

(f) All examinations will be closed book, with no written or printed materials of any kind permitted. Computers or calculators capable of storing text information or formulas are not allowed. Non-text electronic calculators may be used.

5. Policy on Missed Work

For missed "wet" lab work, refer to the "Purple Page for Lab Absences in First-Year Chemistry" posted under "Course Resources" on the course web site.

If you did not write the midterm examination, documentation must be given to your professor in person. Do not request that program counsellors or others mail the documentation to the Chemistry Department. If a valid excuse for not writing the midterm examination is received, the percentage value of the midterm will be added to the final examination percentage value, otherwise, a grade of zero will be assigned. No make-up midterm examination will be given.

In the case of a missed final examination, you should contact your program counsellor (refer to http://www.uoguelph.ca/uaic/students_counsellors.shtml) as soon as possible. Official documentation is required for a missed final examination.

6. Lecture Schedule

Lecturers will cover the same material but may do so in a different order. Thus it is important that you attend your assigned lecture section throughout the semester. Please read the appropriate sections in the text before lectures.

Week/Date	‡Lecture	Topics	*Web Site Assignment	Text Reference
Week 0	Special Class	How to do well in this course	*Stoichiometry* **e-lectures**: *topics 1-3 and 7	*Review Ch 1, 2 *Ch 5, 5.3-5.5
Week 1 Sept.11-15	1-3	Stoichiometry	*Stoichiometry* **e-lectures**: topics 4-6	Ch 3, 3.1-3.8 Ch 4, 4.1-4.4, 4.7-4.10
Week 2 Sept.18-22	4-6	Equilibrium	Equilibrium simulation	Ch 15, 15.1-15.5, 15.7
Weeks 3-6 Sept. 25- Oct. 20	7-17	Acids and bases Salts Buffers	*Acid-Base* **e-lectures**, topics 1-7 *Salts* **e-lectures**, topics 1-3 *Buffers* **e-lectures**, topics 1-2	Ch 16, 16.1-16.8 Ch 17, 17.1-17.6
Week 7 Oct.23-27	18-20	Titration curves K_{sp}	Titration animation	Ch 17, 17.7 Ch18, 18.1-18.3 Ch 7, 7.1-7.3
Weeks 8-9 Oct. 30- Nov.10	21-26	Atomic structure Periodic trends, Lewis structures, VSEPR, bonding, intermolecular forces	VSEPR tutorial	Ch 7. 7.4-7.5 Ch 8, 8.1-8.7 Ch 9, 9.2-9.9 Ch 10, 10.1-10.4 Ch 11, 11.5
Weeks 10-12 Nov. 13- Dec. 1	27-34 35	Organic chemistry Final examination review	Structural isomers tutorial *Nomenclature practice quiz Stereoisomers tutorial	Ch 24, 24.1-24.7 Ch 25, 25.1

‡The number of lectures per topic is approximate.
*Topics marked with an asterisk are *Things You Should Know* and will not be formally covered in class but could be on examinations.

Midterm Examination, Saturday, Oct. 21, 9:30-11:00 a.m.
The midterm covers lectures 1-17, corresponding problem assignments, and references to the text. This exam will be made up of multiple choice questions and one page of short answer questions. There is a sample midterm on the web site.

The **Final Examination**, **December 6, 8:30-10:30 a.m.**, covers the entire course.

7. "Wet" Laboratory Schedule

Week / Date		
1 Sept. 11-15	Check-in, Safety in the Laboratory The Safety Laboratory is a legal requirement!	No Quiz
2 Sept. 18-22	Experiment 1 Gravimetric Analysis of Copper	Quiz on Safety & Expt. 1
3 Sept. 25-29	Experiment 2 Chemical Reactions in Aqueous Solution	No Quiz
4 Oct. 2-6	Experiment 3 Standardization of Sodium Hydroxide	Quiz
5 Oct. 10-13	No "wet" lab this week	
6 Oct. 16-20	Midterm Preparation Problem Lab	No Quiz
7 Oct. 23-27	Experiment 5 Buffers, Titration Curves and Indicators	Quiz
8 Oct. 30-Nov. 3	Experiment 4 Aspirin - An Important Acid	Quiz
9 Nov. 6-10	Experiment 7 Bonding and Molecular Structure	No Quiz
10 Nov. 13-17	Experiment 8 Separation of an Organic Mixture	No Quiz
11 Nov. 20-24	Complete Experiment 4 and Experiment 8 Experiment 9 Organic Chemistry	Quiz on Expt. 8
12 Nov. 27-Dec.1	Check-out, Clean-up	No Quiz

8. Problems

Problems are assigned to provide reinforcement of the principles covered in lectures, to allow you to practice problem solving techniques and to check your own knowledge before examinations. Work done on these problems is not graded, but there is a good correlation between mastering the problems on a week-by-week basis and performance in the course as a whole.

Work the problems in the week that the material is covered in lectures. A common reason why students fail CHEM*1040 is that they fall so far behind with the material that they never catch up. Lectures become harder to comprehend without the reinforcement effect of constant practice.

Work the problems independently. Working from the solutions is not useful for learning. The detailed solutions to the problems are contained in the "Student Solutions Manual" which is included with the text. Several copies of the text as well as the "Student Solutions Manual" will be placed on 2 hour reserve in the library.

Please note, no solutions for the **"B"** problems will be available. Answers only are posted on the "**Course Resources**" page. For help doing any of these problems, please see your professor or go to the Help Room.

PROBLEMS

Stoichiometry and reactions: Lectures 1-3

Text, chapter 1: 1.29, 1.35, 1.75, 1.77, 1.121, **1.152**.

Text, chapter 2: 2.37, 2.45, 2.59, 2.61, 2.69, 2.71, 2.73, 2.77, 2.79, 2.81, 2.85, 2.87, 2.93, 2.95, 2.103, 2.105, 2.113, 2.117, 2.121, **2.136**.

Text, chapter 3: 3.18, 3.31, 3.33, 3.39, 3.55, 3.59, 3.61, 3.67, 3.75, 3.77, 3.83, 3.85, 3.87, 3.91, 3.97, 3.99, 3.111, 3.113, **3.121**.

Text, chapter 4: 4.23, 4.25, 4.29, 4.31, 4.33, 4.35, 4.37, 4.45, 4.63, 4.65, 4.67, 4.71, 4.73, 4.75, 4.79, 4.81, 4.83, 4.87, 4.99, 4.101, 4.103, 4.105, 4.109, 4.113, 4.117, 4.119, 4.121, 4.129, **4.146**.

Text, chapter 5: 5.69, 5.71, 5.81, 5.113, **5.139**.

Equilibrium, acids, bases, salts, and buffers: Lectures 4-17

A.

Text, chapter 15: 15.17, 15.19, 15.29, 15.31, 15.33, 15.35, 15.37, 15.45, 15.47, 15.49, 15.51, 15.53, 15.55, 15.57, 15.67, 15.69, 15.77, 15.81.

Text, chapter 16: 16.21, 16.22, 16.23, 16.25, 16.27, 16.29, 16.45, 16.47, 16.51, 16.53, 16.55, 16.61, 16.65, 16.79, 16.93, 16.101, **16.109**.

Text, chapter 17: 17.1, 17.6, 17.8, 17.9, 17.10, 17.12, 17.17, 17.19, 17.21, 17.23, 17.29, 17.31, 17.33, 17.35, 17.37, 17.39, 17.45, 17.47, 17.49, 17.51, 17.53, 17.57, 17.59, 17.61, 17.65, 17.67, 17.69, 17.71, 17.73, 17.75, 17.77, 17.93, 17.99, 17.103, 17.105, 17.107, 17.113, **17.134** (Test 1-calculations involving polyprotic acids are not required; Test 2; Test 3-questions 1-10, 14 only).

B.

1. Can large concentrations of the following ions be present simultaneously in aqueous solution? If not, write a net ionic equation for the reaction that occurs.
   (a) H_3O^+ and NO_2^-
   (b) Na^+ and ClO_4^-
   (c) NH_4^+ and OH^-
2. For each of the following solutes, identify the major species existing in aqueous solution and classify each solution as acidic, basic, or neutral, explaining, where appropriate, by a net ionic equation.
   (a) $(CH_3)_3N$ (b) $NaNO_3$ (c) $(CH_3)_2NH_2\,Br$
   (d) Na_2CO_3 (e) $NaClO_4$ (f) $NaHCO_3$
3. Write net ionic equations for the reactions that occur when HCl and NaOH are added to the following solutions and calculate the equilibrium constant in each case.
   (a) $CH_3COOH/Na(CH_3COO)$ buffer (b) $C_2H_5NH_3Cl/C_2H_5NH_2$ buffer

Titration curves and solubility equilibria: Lectures 18-20

A.

Text. chapter 17: 17.15, 17.16, 17.25, 17.79, 17.81, 17.83, 17.85, 17.101, 17.111, **17.134** (Test 3-questions 11-13, 15-20 only).

Text, chapter 18: 18.15, 18.21, 18.23, 18.27, **18.108** (Test 1).

B.

1. Write a balanced net ionic equation and calculate the equilibrium constant for each of the following reactions in aqueous solution.

   (a) NaOH + HOCl

   (b) Na(HCOO) + HCl

2. Describe the contents of the following titration reactions at the stoichiometric (equivalence) point in terms of the solutes present in solution and their approximate concentrations.

   (a) 0.100 M HCOOH(aq) + 0.100 M NaOH(aq)

   (b) 0.100 M $HClO_4$(aq) + 0.100 M $Ba(OH)_2$(aq)

   (c) 0.100 M C_5H_5N(aq) + 0.100 M HCl(aq)

   Choose a suitable indicator for each titration.

3. (a) Write the reaction which represents the solubility product expression, K_{sp}, of silver iodide. (For AgI, $K_{sp} = 8.3 \times 10^{-17}$)

   (b) Calculate the equilibrium constant for the reaction of KI(aq) with $AgNO_3$(aq).

Atomic and molecular structure, periodic trends, bonding, intermolecular forces: Lectures 21-26

Text, chapter 7: 7.19, 7.27, 7.31, 7.39, 7.55, 7.63, 7.81, 7.85, **7.97**.

Text, chapter 8: 8.16, 8.21, 8.24, 8.33, 8.43, 8.57, 8.75, **8.91**.

Text, chapter 9: 9.37, 9.39, 9.43, 9.51, 9.53, 9.57, 9.59, 9.63, 9.65, 9.71, 9.87, 9.91, 9.93, **9.121**.

Text, chapter 10: 10.21, 10.25, 10.27, 10.29, 10.33, 10.35, 10.39, 10.43, 10.47, 10.59, 10.63, 10.67, **10.89**.

Text, chapter 11: 11.57, 11.63, 11.65.

Organic Chemistry: Lectures 27-34

Organic Chemistry Notes for CHEM*1040: All Study Questions for each section.

Text, chapter 24: 24.14, 24.21, 24.25, 24.31, 24.35, 24.37, 24.49, 24.51, 24.61, **24.70**.

Text, chapter 25: 25.25, 25.49, 25.51.

10. Course Quiz

1. Where can I find the course web site?
2. When should I do the assigned problems?
3. How much is the final examination worth toward my final grade?
4. What materials are required for this course?
5. Is there a lab quiz for Experiment 8?
6. How many online quizzes are there?
7. When do the laboratories start and how often do I have them?
8. When is the midterm exam?
9. What happens if I cannot write the midterm?
10. Where do I find the Self-Assessment Quiz and is it for credit?
11. When and where will I do the Computer Labs?
12. How are the computer labs marked?
13. How do I find out where I will write the midterm?
14. What must I do if I cannot get into the course web site?
15. What course topics will be covered in Week 7?
16. What reasons/excuses will be accepted if I miss doing an online Quiz for credit?