Student Course Information

General Chemistry I

CHEM*1040

Fall 2005

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

1. Required Materials

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

(b) Organic Chemistry Notes for CHEM*1040. Purchased in the Department.

(c) Laboratory Manual for CHEM*1040. Purchased in the Department.

(d) Cochrane's of Oxford Molecular Model Kit, available in the University Bookstore. This will be useful for the material on molecular shape, and organic chemistry.

(e) Safety goggles (not safety glasses) and lab coat: available in the University Bookstore.

(f) 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. Laboratory

Laboratories begin on Monday, September 12. 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) Thanksgiving Week
All students will do the Volumetric Analysis Computer Lab found on the CHEM*1040 web site.

(e) Laboratory Exemptions for students who are repeating CHEM*1040.
Application must be made before Tuesday, September 13 by filling in the application form posted near the water fountain on the second floor of SCIE. Students who obtained a laboratory grade of at least 12/20 during one of the three preceding semesters in which the course was offered may apply for a laboratory exemption. Students who are granted a lab exemption should attend any one of the problems labs in week 6.

3. Web Site

The CHEM*1040 web site is an integral part of the course and must be accessed daily. The web site can be accessed through the portal at **http://courselink.uoguelph.ca**. Your **WebCT 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 technical problems using WebCT, move the cursor to the "Students" link at the top of the Courselink@Guelph page (Login page) and select the appropriate link from the menu.
If you do not have a Central Login Account, go to http://www.uoguelph.ca/ccs/index.shtml, click on undergraduate student accounts and follow the instructions.

4. Help

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

(b) **Lecture Help** in the Chemistry Help Room (MACN 106 in the MACN foyer)

The Lecture Help schedule is posted on the web site Home page under "Announcements".

Laboratory Help in the Chemistry Help Room (MACN 106 in the MACN foyer)

Tuesday, Wednesday and Thursday from 4:00 - 5:00 p.m.

(c) 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 class meeting and are posted on the SLG web site: **http://www.learningcommons.uoguelph.ca/SLG/index.html**. These sessions have proven very helpful to students.

(d) Web Site

The web site contains a variety of activities to help you with the course and should be accessed daily.

5. Evaluation

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

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

(b) **Online Quizzes**

The quizzes are delivered on the web site. 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 and will be available on the dates listed below from 7:00 a.m. Tuesday until 11:55 p.m. Thursday. Each quiz can only be accessed at these times and **no reason** for missing a quiz will be accepted. If a quiz is not attempted, a grade of zero will be assigned. Please do not leave your quiz attempt until the last day!

Quiz #1 - **Stoichiometry and Reactions**, Sept. 20 - 22
Quiz #2 - **Equilibrium, Acids, and Bases**, Oct. 4 - 6
Quiz #3 - **Salts and Buffers**, Oct. 18 - 20
Quiz #4 - **Titration Curves and Solubility Equilibria**, Nov. 1 - 3
Quiz #5 - **Titration Curves, Atomic and Molecular Structure**, Nov. 15 - 17
Quiz #6 - **Organic Chemistry**, Nov. 29 - Dec. 1

Computer Labs

The Computer Labs consist of 2 parts, the Experiment and the Marking Module. Both are delivered on the web site. After completing the Experiment, input your calculated results into the Marking Module by the last date for each lab. The Marking Module can only be opened once.

Volumetric Analysis Computer Lab, Oct. 11 - 18
Atomic Spectroscopy Computer Lab, Nov. 7 - 15

Midterm Examination

Saturday, October 22, 9:30 - 11:00 a.m. Room assignments will be posted outside all laboratories and on the web site under "Announcements".

Midterm Examination Conflict: please apply in writing, during the week of October 11 only, to write the alternate midterm examination on Thursday, October 20 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 Mon. 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 under "Announcements".

(c) 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.

6. Policy on Missed Midterm Examination

A grade of zero will be assigned for a missed midterm examination except for valid medical or compassionate reasons. 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. No make-up midterm examination will be given.

7. 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	*Assignment	Text Reference
Week 1 Sept.12-16	1-3	Stoichiometry	*Stoichiometry* **e-lectures**: *topics 1-3 and 7 topics 4-6	*Review Ch 1, 2 Ch 3, 3.1-3.8 Ch 4, 4.1-4.4, 4.7-4.10 *Ch 5, 5.3-5.5
Week 2 Sept.19-23	4-6	Equilibrium	Equilibrium simulation	Ch 15, 15.1-15.5, 15.7
Weeks 3-6 Sept. 26- Oct. 21	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.24-28	18 19 20	Titration curves K_{sp} Atomic structure	Titration animation	Ch 17, 17.7 Ch18, 18.1-18.3 Ch 7, 7.1-7.3
Weeks 8-9 Oct. 31- Nov.11	21-26	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. 14- Dec. 2	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 not covered in class but will be examined.

Midterm Examination, Saturday, Oct. 22, 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 covers the entire course and is scheduled by the registrar.

8. Laboratory Schedule

Week / Date		
1 Sept. 12-16	Check-in, Safety **Online Self-Assessment Quiz (accessed on the web site). (must be completed by Sept. 16)**	No Quiz
2 Sept. 19-23	Experiment 1 Gravimetric Analysis of Copper	Quiz on Safety & Expt. 1
3 Sept. 26-30	Experiment 2 Chemical Reactions in Aqueous Solution	No Quiz
4 Oct. 3-7	Experiment 3 Standardization of Sodium Hydroxide	Quiz
5 Oct. 11-14	**Volumetric Analysis Computer Lab* (Oct.11-18) (Lab must be completed by Oct. 18, 5 pm.)**	No Quiz
6 Oct. 17-21	Midterm Preparation Problem Lab	No Quiz
7 Oct. 24-28	Experiment 5 Buffers, Titration Curves and Indicators	Quiz
8 Oct. 31-Nov. 4	Experiment 4 Aspirin - An Important Acid	Quiz
9 Nov. 7-11	**Atomic Spectroscopy Computer Lab* (Nov.7-15) (Lab must be completed by Nov. 15, 5 pm.)**	No Quiz
10 Nov. 14-18	Experiment 8 Separation of an Organic Mixture	No Quiz
11 Nov. 21-25	Complete Experiment 4 and Experiment 8 Experiment 9 Organic Molecular Models	Quiz on Expt. 8
12 Nov. 28-Dec.2	Check-out, Clean-up	No Quiz

*The Computer Labs consist of 2 parts, the Experiment and the Marking Module. Both are delivered on the web site. The Experiments can be done at any time during the assigned dates. After completing the Experiment, input your calculated results into the Marking Module by the last date for each lab. The Marking Module can only be opened once. The Experiments, however, can be done as many times as you wish but, each time you do a lab you will be assigned a new "unknown." After you are satisfied with your results and have done all calculations, only then input the results into the Marking Module. Do not open the Marking Module until you have completed your calculations.

9. 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. To check an answer or for help doing any of these problems, please see your professor or go to the Help Room.

PROBLEMS

Stoichiometry and reactions: Lectures 1-4

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 5-17

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).

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, 19

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).

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 20-26

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 27-35

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 towards 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?