Student Course Information

CHEM*1040 – General Chemistry I

Winter 2006

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1. Required Materials

(a) **Textbook**: *General Chemistry*, 8 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) **Indigo Instruments Molecular Model Kit**, available in the University Bookstore. This will be very useful for the material on molecular shape and organic chemistry.

(e) **Safety goggles** (not safety glasses) **and lab coats** are required and 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.

NOTE: CHEM*1050 – General Chemistry II will NOT be offered in Summer 2006.

2. Laboratory

Laboratories begin in Week 1 on Monday, January 9. Bring your laboratory manual if possible. The laboratory is an integral part of the course and you must attend all the labs.

(a) Laboratory Time and Authorisation

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. Refer to the Laboratory Schedule for details (page 6). It is essential that the experiment to be done be studied carefully in advance of the laboratory period.

(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

Students who obtained a laboratory grade of **at least 60%,** but who fail the course as a whole, may apply for a laboratory exemption. The laboratory work must have been completed **during one of the three preceding semesters** in which the course was offered. To apply, fill out the application form posted near the water fountains on the second floor of SCIE.

DEADLINE: TUESDAY, JANUARY 10, 2006

Students repeating CHEM*1040 with a lab exemption are strongly encouraged to attend the Problem Laboratory in Week 7. You may attend any lab that week and the Problem Lab questions will be posted on the website.

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 ID (that part of your assigned University of Guelph e-mail address before the @ sign) and your **password** is your Central Login Account Password. (If you do not have a Central Login Account, e-mail webadv@registrar.uoguelph.ca and include your full name and U of G student ID.) 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, go to http://courselink.uoguelph.ca/faq_main.html and select the appropriate link from the menu.

4. Help

(a) Lecture & Laboratory Help

Dr. Jones will be available at certain times for consultation and help.
Office hours:

(b) Supported Learning Groups (SLGs)

SLGs 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. **These sessions have proven very helpful.** The session times and locations will be announced during the first class meeting and the SLG web site is linked to the CHEM*1040 WebCT Course Resources page.

(c) Web Site

The web site contains a variety of activities to help you with the course. All announcements regarding CHEM*1040 are also posted on the web site. Please access the web site daily.

5. Evaluation

The course grade will be calculated as follows:

Online Quizzes (web site)	10%
Computer Labs (web site)	5%
Midterm Examination	25%
Laboratory	20%
Final Examination	40%

(a) 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. Answers may be accessed **ONLY** on Friday until Monday of the quiz week.

The quizzes are 75 minutes in duration and are 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 can only be attempted once. **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 Schedule:

Quiz #1 – **Stoichiometry & Reactions**, January 17– 19 (week 2)
Quiz #2 – **Equilibrium, Acids & Bases**, January 31 – February 2 (week 4)
Quiz #3 – **Salts & Buffers**, February 14 – 16 (week 6)
Quiz #4 – **K_{sp}, Atomic & Molecular Structure**, March 21 – 23 (week 10)
Quiz #5 – **Organic Chemistry**, April 4 – 6 (week 12)

(b) Computer Labs

The computer labs consist of two parts: the experiment and the marking module. Both are delivered on the website. 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, and is similar in format to a quiz.

Volumetric Analysis Computer Lab, February 6 – 14
Atomic Spectroscopy Computer Lab, March 13 – 21

(c) Midterm Examination: **Saturday, March 4, 9:30 a.m. - 11:00 a.m.**

Room assignments will be posted on the web site under "Announcements".
If you have a legitimate conflict, you will be given the opportunity to write an alternate CHEM*1040 midterm on Thursday, March 2nd at 5:30 – 7:00 p.m. Please apply in writing during the week of February 13 – 17 to your professor. Include your name, ID, and reason for conflict. The location of the alternate test will be posted on the web site under "Announcements".

(d) Final Examination Date**:** **Wednesday, April 12th, 11:30 am – 1:30 pm**
Room assignments will be made by the Registrar's office before the final exam period.

(e) All tests and 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, Final Examination or Laboratory

a) Missed Midterm Examination: A grade of zero will be assigned if you do not write the 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.

b) Missed Final Examination: You should contact your Program Counsellor as soon as possible and you will need to submit official documentation. For further details, consult the Undergraduate Calendar (Section VIII, under Academic Consideration – Incomplete Final Examinations /Final Assignments).

c) Missed Laboratory: Follow the directions on the "Purple Page for Lab Absences in First-Year Chemistry" handout given to you in the laboratory or posted on the CHEM*1040 WebCT site.

7. Lecture Schedule – Please read the appropriate sections in the text **before** lectures.

Week/Date	‡Lecture	Topics	*Assignment	Text Reference
Week 1 Jan. 9 – 13	1 – 3	Stoichiometry and reactions	*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 Jan. 16 – 20	4 – 6	Equilibrium	Equilibrium simulation	Ch 15, 15.1 – 15.5, 15.7
Week 3–6 Jan. 23 – Feb. 17	7 – 18	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
Feb. 20 – 24	No Classes	WINTER BREAK		
Week 7 Feb. 27 – Mar. 3	19 – 21	Titration curves K_{sp} Review	Titration animation	Ch 17, 17.7 Ch 18, 18.1 – 18.3
Mar. 4		**Midterm Exam:**	**9:30 – 11:00 a.m.**	
Week 8 – 9 Mar. 6 – 17	22 – 27	Atomic structure, periodic trends, Lewis structures, VSEPR, bonding, intermolecular forces	VSEPR tutorial	Ch 7, 7.1 – 7.5 Ch 8, 8.1 – 8.7 Ch 9, 9.2 – 9.9 Ch 10, 10.1 – 10.4 Ch 11, 11.5
Week 10 – 12 Mar. 20 – Apr. 7	28 – 36	Introduction to organic chemistry Review	Structural isomer tutorial *Nomenclature practice quiz Stereoisomers tutorial	Ch 24, 24.1 – 24.7 Ch 25, 25.1 Organic Chemistry Notes – all questions

‡ 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, March 4, 9:30 – 11:00 a.m.
The midterm covers lectures 1-21, corresponding problem assignments, and references to the text. This exam will be made up of multiple choice, short answer questions, and problems similar to the problem assignments. There is a sample midterm on the web site.

The final examination covers the entire course and is scheduled by the registrar:
Wednesday, April 12th, 11:30 am – 1:30 pm

8. Laboratory Schedule

Week / Date		
1 Jan. 9 – 13	Check-in and safety **On-line Self-Assessment Quiz – accessed on web site** **(must be completed by Friday, January 13)**	No Quiz
2 Jan. 16 – 20	Experiment 1: Gravimetric Analysis of Copper (Quiz on Safety and Expt. 1)	Quiz
3 Jan. 23 – 27	Experiment 2: Chemical Reactions in Aqueous Solution	No Quiz
4 Jan. 30 – Feb. 3	Experiment 3: Standardization of Sodium Hydroxide	Quiz
5 Feb. 6 – 10	**Volumetric Analysis Computer Lab† (Feb. 6 – 14)** **(Lab results must be submitted by Tuesday, Feb. 14, 5:00 p.m.)**	No Quiz
6 Feb. 13 – 17	Experiment 5: Buffers, Titration Curves and Indicators	Quiz
Feb. 20 – 24	**WINTER BREAK**	
7 Feb. 27 – Mar 3	Midterm Preparation Problem Laboratory (Problem Lab questions will be posted on CHEM*1040 WebCT.)	No Quiz
8 Mar 6 – 10	Experiment 4: Synthesis of Aspirin - an Important Acid	Quiz
9 Mar 13 – 17	**Atomic Spectroscopy Computer Lab†** – Refer to Expt. 6 **(Lab results must be submitted by Tuesday, Mar. 21, 5:00 p.m.)**	No Quiz
10 Mar 20 – 24	Experiment 8: Separation of an Organic Mixture	No Quiz
11 Mar 27 – 31	Experiment 9: Organic Molecular Models (bring molecular model kit) Complete Experiments 4 & 8	Quiz on Expt. 8
12 Apr. 3 – 7	Clean-Up, Check-out and Check Final Lab Grades	No Quiz

† The on-line computer labs consist of two parts: the experiment and the marking module. You can access both from the CHEM*1040 WebCT website. The experiments can be done at any time during the assigned dates and can be done as many times as you wish but, each time you will be assigned a new "unknown". After you are satisfied with your results and have done all calculations, only then input your calculated results into the marking module by the last date for each lab. Do not open the marking module until you have completed your calculations. The marking module can only be opened once and is similar to the quizzes in format.

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 quizzes and examinations. Work done on these problems is not graded, but there is a good correlation between mastering the concepts within 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 are unsuccessful in 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's Solutions Manual which is included with the text. The Student's Solutions Manual will also be on two-hour reserve in the library along with several copies of the text (search "CHEM*1040"). If you have difficulties, seek help early!

The questions in bold at the end of each chapter refer to the ACE practice tests on the publisher student web site. There is a link to this site on the CHEM*1040 WebCT web site. For more information see the *MEDIA GUIDE FOR STUDENTS* which is included with the text.

Further questions for your practice called "Questions of the Week" can be found under "Course Resources" on the website. Answers to these, as well as the "Section II" problems, are posted on the website on the lecture outline web page.

Stoichiometry and Reactions: Lectures 1- 3

Chapter 1: 1.29, 1.35, 1.75. 1.77, 1.121, **1.152**.

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**.

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**.

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**.

Chapter 5: 5.69, 5.71, 5.81, 5.113, **5.139**.

Equilibrium, acids, bases, salts and buffers: Lectures 4 -18

Section I:

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.

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**.

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, **17.134** (Test 1; calculations involving polyprotic acids not required; Test 2; Test 3 – questions 1-10, 14).

Section II: Answers to these problems can be found on the website (on Lecture Outlines page).

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^-

   (d) H_3O^+ and Br^-

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) $(CH_3)_2NH_2Br$

   (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/CH_3COONa buffer (b) $C_2H_5NH_3Cl/C_2H_5NH_2$ buffer

Titration curves and solubility equilibrium: Lectures 19-21

Section I:

Chapter 17: 17.15, 17.16, 17.25, 17.79, 17.81, 17.83, 17.85, 17.101, 17.111, 17.113, **17.134** (Test 3 – questions 11-13, 15-20).

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

Section II: Answers to these problems can be found on the website (on Lecture Outlines page).

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, $K = 8.3 \times 10^{-17}$)

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

Atomic & molecular structure, periodic trends, bonding & intermolecular forces: Lectures 22-27

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

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

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**.

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**.

Chapter 11: 11.57, 11.63, 11.65.

Organic Chemistry: Lectures 28-35

Organic Chemistry Notes for CHEM*1040: All study questions for each section.

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

Chapter 25: 25.25, 25.49, 25.51.

10. Course Quiz

a) Where can I find the course web site?

b) How much is the midterm exam worth towards my final grade?

c) When should I do the assigned problems?

d) What material will be on the final examination and when is it?

e) What materials are required for this course?

f) Is there a lab quiz for Experiment 8?

g) How many on-line quizzes are there?

h) When do the laboratories start and how often do I have them?

i) When is the midterm exam and what happens if I cannot write it?

j) Where do I find the Self-Assessment Quiz and is it for credit?

k) When and where will I do the Computer Labs? How are they marked?

l) When can I view my on-line quiz after it is graded?

m) How do I find out where I will write the midterm?

n) What must I do if I cannot get into the course web site?

o) What course topics will be covered in Week 7?