Student Course Information

CHEM*1040 – General Chemistry I

Winter 2005

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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. (Same text and solutions manual as used last semester for CHEM*1040.)

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

(c) **Laboratory Manual for CHEM*1040**. Purchased in the Department.
Bring your laboratory manual to your first lab, if possible.

(d) **Cochrane's of Oxford Molecular Model Kit**, available in the University Bookstore. This is required for certain laboratory periods.

(e) **Safety goggles and lab coat**: available in the University Bookstore.
Must be worn in the laboratory at all times.

(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. Lectures

There are three lectures per week: Mondays, Wednesdays & Fridays from 13:30 - 14:20 in Axelrod (AXEL) 200

3. Laboratory

Laboratories begin in Week 1, Monday, Jan. 10. Students will attend their chemistry lab **EVERY** week. The laboratory is a required component of the course.

(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**. You must take the labs in the time period registered.

(b) Laboratory Quizzes

A brief quiz will be held at the beginning of certain laboratory periods. See the Laboratory Schedule for details. These quizzes count towards your laboratory grade, and will usually be based on the experiment that you are about to perform. It is essential that the experiment be studied carefully in advance of the laboratory period in which it is to be done.

(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, please fill out the application form posted near the water fountains on the second floor of SCIE.

DEADLINE: Tuesday, January 11, 2005

Students repeating CHEM*1040 are strongly encouraged to attend the Problem Laboratories (see the lab schedule). You may attend any of the labs that week.

4. Web Site

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. The first page is "myWebCT: your name" which will list all your WebCT courses including CHEM*1040. **The CHEM*1040 web site is an integral part of the course and must be consulted on a regular basis.** 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/accounts/index.html, click on undergraduate student accounts and follow the instructions.

5. Help

(a) Instructor

Your instructor will be available at certain times for consultation and help. Office hours will be arranged at the first class meeting.

(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 are posted on the SLG web site: **http://www.learningcommons.uoguelph.ca/slg/index.htm**.

(c) Web Site

The web site contains a variety of activities to help you with the course. There are e-lectures, practice quizzes and examinations, animations on acids, bases, buffers, titration curves, and equilibrium, a VSEPR interactive tutorial, a frequently-asked questions page, a Periodic Table with descriptive chemistry, interactive laboratory exercises and much more. All announcements regarding CHEM*1040 are also posted on the web site. Please access the web site daily.

6. Evaluation

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

Quizzes (web site)	10%
Midterm Examination	30%
Laboratory	20%
Final Examination	40%

(b) Quizzes and Midterm Examination Dates:

i) **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 are available on the dates listed below from 1:00 a.m. Tuesday until 11:55 p.m. Thursday. The answers to your quiz may be accessed on the Friday, Saturday and Sunday of the quiz week. Each quiz can **ONLY** be accessed at these times. Each quiz 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 Dates:

Quiz #1 - **Stoichiometry**, January 25– 27
Quiz #2 - **Acids, Bases and Salts**, February 15 – 17
Quiz #3 - **Atomic and Molecular Structure**, March 22 – 24
Quiz #4 - **Organic Chemistry**, April 5 - 7

ii) **Midterm Examination**: Saturday, March 5, 2:30 p.m. - 4:00 p.m. ROZH 104
The midterm will consist of multiple choice questions, short answer questions and problems similar to those found in the problem assignments.

iii) **Midterm Conflict**: If you have a legitimate conflict, you will be given the opportunity to write an alternate CHEM*1040 midterm on

Thursday, March 3rd at 5:30 – 7:00 p.m.

Please apply in writing, to your instructor, during the week of February 14 - 18. Include your name, ID, and reason for conflict. The location of the alternate test will be posted on the web site under "Announcements".

iv) **Final Examination Date: Friday, April 15, 7:00 – 9:00 p.m**.
The final exam will cover the entire course and will consist of multiple choice questions, short answer questions and problems. (Note: Room assignments will be made by the Registrar's office before the final exam period.)

v) All tests and examinations will be closed book, with no written or printed materials of any kind permitted. Electronic calculators may be used. Computers or calculators capable of storing text information or formulas are not allowed.

7. Policy on Missed Tests, Exam and Laboratories

A grade of zero will be assigned for any missed laboratory, test or examination.
Valid medical or compassionate reasons that may excuse you from missed work can be considered only if the correct procedure for requesting such an exemption is followed.

a) Missed Tests: For a missed test, **documentation must be given to your instructor in person.** There is no need to consult a doctor to obtain a note; however, if you have consulted a medical practitioner because of illness or injury, the doctor's note is acceptable documentation. If a valid excuse is received, the percentage value of the test will be added to the final exam percentage value. **No make-up test will be given.**

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

c) Missed Laboratories: Follow the directions on the Purple Page given to you in the laboratory or posted on the CHEM*1040 WebCT site.

8. Lecture, Reading and Problem Schedule

Please read the appropriate sections in the text before lectures.

Week	Date	Lecture	Topics	Reference
1 – 2	Jan. 10 to Jan. 21	1 – 6	Stoichiometry and reactions	Review, Ch 1 & 2 Ch 2, 2.3-2.9 Ch 3, 3.1-3.8 Ch 4, 4.1-4.10 Ch 5, 5.3-5.5 (assigned reading)
3 – 6	Jan. 24 to Feb. 18	7 – 17	Chemical equilibrium, acids, bases and salts	Ch 15, 15.1-15.5, 15.7 Ch 16, 16.1, 16.2, 16.4-16.8 Ch 17, 17.1-17.5
Feb. 21 to Feb. 25			WINTER BREAK	
7	Feb. 28 to Mar. 4	18 – 20	Buffers and titration curves The solubility product constant	Ch 17, 17.6, 17.7 Ch 18, 18.1, 18.2
	Mar. 5		**Midterm Exam: 2:30 – 4:30 p.m.**	
8 – 9	Mar. 7 to Mar. 18	21 – 27	Atomic and molecular structure, periodic trends, bonding, intermolecular forces	Ch 7, 7.1-7.5 Ch 8, 8.1-8.7 Ch 9, 9.3, 9.4-9.9 Ch 10.1-10.4 Ch 11, 11.5
10 – 12	Mar. 21 to Apr. 8	28 – 35	Introduction to organic chemistry	Organic Notes for CHEM*104, all questions Ch 24, 24.1-24.7 Ch 25, 25.1

Midterm Examination, Saturday, March 5, 2:30-4:00 p.m.

The midterm covers lectures 1-20, 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:
Friday, April 15th, 7:00 p.m. – 9:00 p.m.

9. Laboratory Schedule

Note: All CHEM*1040 labs this semester will be held in **SCIE 2105 <u>NOT</u>** SCIE 2101.

Week / Date		
1 Jan. 10-14	Check-in, Safety	No Quiz
2 Jan. 17-21	Experiment 1 Gravimetric Analysis of Copper (Quiz on Safety and Expt. 1)	Quiz
3 Jan. 24-28	Experiment 2 Chemical Reactions in Aqueous Solution	No Quiz
4 Jan. 31 - Feb. 4	Experiment 3 Standardization of Sodium Hydroxide	Quiz
5 Feb. 7-11	Experiment 4 Synthesis of Aspirin - an Important Acid	Quiz
6 Feb. 14-18	Experiment 5 Buffers, Titration Curves and Indicators	Quiz
Feb. 21-25	**WINTER BREAK**	
7 Feb. 28 - Mar 4	Problems Laboratory	
8 Mar 7-11	Experiment 6 Atomic Spectroscopy	Quiz
9 Mar 14-18	Experiment 7 Bonding and Molecular Structure (bring molecular model kit)	No Quiz
10 Mar 21-24*	Experiment 8 Separation of an Organic Mixture	No Quiz
11 Mar 28- Apr. 1	Experiment 9 Organic Molecular Models (bring molecular model kit) Complete Experiments 4 & 8	Quiz on Expt. 8
12 Apr. 4-8	Clean-Up	No Quiz

***March 25 is Good Friday - No Classes are Scheduled.**

10. 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 first year Chemistry 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.

If you have difficulties, it is your responsibility to seek help. Remember that we want to help!

Solutions to problems
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.

*****The CD referred to below is the "Problem-solving Skills" CD that comes with the text.

ASSIGNED PROBLEMS

Stoichiometry and reactions: Lectures 1-6

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.

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, 4.49, 4.53, 4.55, 4.57, 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 and salts: Lectures 7-17

Section I:

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, 17.17, 17.19, 17.21, 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, 17.93, 17.99, 17.103, 17.107, **17.134** (Test 1; calculations involving polyprotic acids not required).

Section II:

No solutions for the following problems will be available. To check an answer or for help doing any of these problems, please see your instructor.

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

   (a) NaOH + HOCl

   (b) HCOONa + HCl

Buffers, titration curves and solubility equilibrium: Lectures 18-20

Buffers, titration curves and solubility equilibria: Lectures 18-20

Section I:

Text chapter 17: 17.12, 17.15, 17.16, 17.23, 17.25, 17.69, 17.71, 17.73, 17.75. 17.77, 17.79, 17.81, 17.83, 17.85, 17.101, 17.105, 17.111, 17.113, **17.134** (Test 3).
Text, chapter 18: 18.15, 18.21, 18.23, 18.27, **18.108** (Test 1).

Section II:

No solutions for the following problems will be available. To check an answer or for help doing any of these problems, please see your instructor.

1. 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

2. Describe the contents of the following titration reactions at the stoichiometric (equivalence) point in terms of the solutes present in solution and their 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 and molecular structure, periodic trends, bonding and solubility equilibria: Lectures 21-27

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 28-35

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.