Student Course Information

CHEM*1040 – General Chemistry I

Winter 2007

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1. REQUIRED MATERIALS

(a) **Textbook:** General Chemistry, 8 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 are purchased within the Department.
Laboratory Manual for CHEM*1040 is purchased within the Department
Safety goggles (not safety glasses) are purchased within the Department

(c) **Lab coats** are required and available in the University Bookstore.

(d) **i-Clicker Student Response Unit** is available in the University Bookstore. A Classroom Response System will be used this semester where students use Personal Response Units (commonly known as "*clickers"*) to register their responses to questions posed in class. Participation marks will be awarded towards your final grade.

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

(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 2007.

2. "WET" LABORATORY

Laboratories begin in Week 1 on Monday, January 8. Refer to the laboratory schedule on page 6. 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 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**. Also bring your lab manual to your first laboratory if possible.

(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. It is essential that the experiment to be studied carefully in advance of your 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) **Missed Laboratory**

Refer to the "Purple Page for Lab Absences in First-Year Chemistry" posted under "Course Resources" on the CHEM*1040 WebCT site and follow the specified directions.

(e) **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 complete the WebCT quiz entitled "Laboratory Exemption Application" found under "Assessments". **DEADLINE:** TUESDAY, JANUARY 9, 2007

Students repeating CHEM*1040 who are granted a lab exemption are strongly encouraged to attend the Problem Laboratory in Week 7. Refer to the Laboratory Schedule. You may attend any lab that week. Check WebAdvisor for times. The Problem Lab will be posted on the WebCT website under Course Resources. Students must also 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 announcements will be posted on the web site and a variety of activities are available. The web site can be accessed through **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. 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.

(b) Lecture & Laboratory Help

Dr. Jones will be available for consultation and help on Wednesdays 2:30 pm – 4:30 pm, Fridays 10:00 am – 12:00 pm **OR** by appointment.

(c) 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. They are not tutors. 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 time(s) and location(s) will be announced during the first week of classes. For more information, go to http://www.learningcommons.uoguelph.ca/SLG.

4. EVALUATION

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

Online Quizzes (web site)	10%
Online "Dry" Laboratory Work (web site)	5%
In-class participation (Classroom Response System)	3%
Midterm Examination	25%
"Wet" Laboratory	20%
Final Examination	37%

(b) **Practice Online Quizzes** (not for credit)

The online Self-Assessment Quiz is available from the course WebCT site during Jan. 8 – 13 and can only be accessed once. Find out what you know! Practice quizzes are available on WebCT the entire semester and can be attempted as many times as you wish.

(c) **Online Quizzes for Credit**

The quizzes are delivered from the WebCT 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. 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** on the Friday to Monday following each quiz. Use this opportunity to review your quiz, make corrections and solidify your understanding.

Quiz #1 – **Stoichiometry & Reactions**, January 16 – 18 (week 2)
Quiz #2 – **Equilibrium, Acids & Bases**, January 30 – February 1 (week 4)
Quiz #3 – **Salts, Buffers and Titration Curves**, February 13 – 15 (week 6)
Quiz #4 – **K_{sp}, Atomic & Molecular Structure**, March 20 – 22 (week 10)
Quiz #5 – **Organic Chemistry**, April 3 – 5 (week 12)

(d) **Online Laboratory Work** (i.e., "Dry" Labs)
Each computer lab consists of two parts: the Experiment and the Marking Module. Both are delivered on the website. 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. After you are satisfied with your results and have completed all calculations, **only then** open the Marking Module to input your results. You may only grade your lab work once. Note the time of the Marking Module deadline.

1. **Volumetric Analysis Computer Lab** – to be completed within Feb. 5 – 13 (5:00 pm)
   Test your understanding of stoichiometric concepts and analysis skills.
2. **Atomic Spectroscopy Computer Lab** – to be completed March 12 – 20 (5:00 pm)
   Explore energy levels in atoms and "fireworks" colours. Based on Expt. 6 in your Laboratory Manual, you can refer to this experiment for further info and work sheets to record your data.

(e) **In-class Clicker participation**
Clickers will be used to promote engagement during lecture and provide feedback on your lecture preparation. Students will register their clicker to their student number on-line. A participation score will be based on the number of clicker responses, regardless of your answer, and corresponds to the following response rates: 0 = 0–32%; 1 = 33–59%; 2 = 60–84%; 3 = 85–100%. It is your responsibility to ensure that your clicker is registered and functional.

(f) **Midterm Examination**: **Saturday, March 3, 4:30 p.m. - 6:00 p.m. ROZH 101&104**
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 1st at 5:30 p.m. Please apply in writing during the week of February 12 – 16 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".

(g) **Final Examination: Saturday, April 14, 7:00 pm – 9:00 pm**
Room assignments will be made by the Registrar's office prior to the final exam period.

(h) 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.

5. POLICY ON MISSED WORK

a) **Missed Midterm Examination**:
If you did not write the midterm examination, documentation must be given to Dr. Jones. 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.

b) Missed Final Examination:
If you miss a final exam, you need to contact your Program Counsellor as soon as possible (refer to http://www.uoguelph.ca/uaic/students_counsellors.shtml for a list of Program Counsellors). Official documentation is required. Consult the Undergraduate Calendar (Section VIII, under Academic Consideration – Incomplete Final Examinations /Final Assignments).

7. LECTURE SCHEDULE – Please read the appropriate sections in the text **before** lectures.

Week/Date	‡Lecture	Topics	*Assignment	Text Reference
Week 1 Jan. 8 – 12	1– 3	Stoichiometry	*Stoichiometry* e-lectures: *topics 1–3 and 7 (review) topics 4 – 6 **On-line Self-Assessment Quiz – accessed on web site (must be completed by Fri., Jan. 12)**	*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. 15 – 19	4 – 6	Equilibrium	Equilibrium simulation	Ch 15, 15.1 – 15.5, 15.7
Week 3–6 Jan. 22 – Feb. 16	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. 19 – 23	No Classes	WINTER BREAK		
Week 7 Feb. 26 – Mar. 2	19 – 21	Titration curves K_{sp} Review	Titration animation	Ch 17, 17.7 Ch 18, 18.1 – 18.3
Mar. 3		**Midterm Exam:**	**4:30 p.m. - 6:00 p.m.**	
Week 8 – 9 Mar. 5 – 16	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. 19 – Apr. 5	28 – 36	Organic chemistry Final Exam 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 3, 4:30 – 6:00 p.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, **Saturday, April 14, 7:00 pm – 9:00 pm,** covers the entire course.

8. LABORATORY SCHEDULE

Week / Date		
1 Jan. 8 – 12	Check-in, Safety in the Laboratory The Safety Laboratory is a legal requirement.	No Quiz
2 Jan. 15 – 19	Experiment 1: Gravimetric Analysis of Copper	Quiz on Safety and Expt. 1
3 Jan. 22 – 26	Experiment 2: Chemical Reactions in Aqueous Solution	No Quiz
4 Jan. 29 – Feb. 2	Experiment 3: Standardization of Sodium Hydroxide	Quiz
5 Feb. 5 – 9	No "wet" lab this week	
6 Feb. 12 – 16	Experiment 5: Buffers, Titration Curves and Indicators	Quiz
Feb. 19 – 23	**WINTER BREAK**	
7 Feb. 26 – Mar 2	Midterm Preparation Problem Laboratory (Problem Lab questions will be posted on CHEM*1040 WebCT.)	No Quiz
8 Mar 5 – 9	Experiment 4: Synthesis of Aspirin - an Important Acid	Quiz
9 Mar 12 – 16	Experiment 7: Bonding and Molecular Structure	No Quiz
10 Mar 19 – 23	Experiment 8: Separation of an Organic Mixture	No Quiz
11 Mar 26 – 30	Experiment 9: Organic Chemistry (bring your organic notes and molecular model kit) Complete Experiments 4 & 8	Quiz on Expt. 8
12 Apr. 2 – 5	Clean-Up, Check-out and Check Final Lab Grades	No Quiz

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. 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 from 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.