

# Chemistry 1B: General Chemistry and Quantitative Analysis

Reedley College, Spring 2008

## SYLLABUS

LECTURE Tuesday, Thursday 11:00 - 12:15 Room PHY 82  
LAB Tuesday, Thursday 12:30 - 3:20 Room PHY 82  
Instructor Otto Berg  
Email otto.berg@reedleycollege.edu  
Office hours after lab

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**Course Objectives.** Chemistry 1B is a general course in inorganic chemistry, including qualitative analysis. The objective is to provide students with a broad understanding of chemical change, both theoretical and experimental, and to develop skill at the calculations commonly used in practical chemistry. In addition to chemistry majors, the course material is relevant for those studying biology, physics, and chemical engineering, and for pre-professional majors in medicine, veterinary medicine, pharmacy, and dentistry.

**Prerequisites:** Chemistry 1A and Math 103

### **Text**

N. J. Tro, *Chemistry: A Molecular Approach* (Pearson Prentice Hall, 2008)  
Chapter numbers in the lecture schedule refer to this book.

### **Lab Manual**

J. Dekker and D. Kimball, *General Chemistry: Quantitative and Qualitative Laboratory Experiments for Science Majors, Book B* (Stipes, 2005)

**Grading** The final course grade is weighted as follows

- 40 % Best four of five exam grades.  
The lowest mid-term exam score will be dropped.  
The final exam is comprehensive, and will count in the final grade.
- 20 % Graded homework.  
Problems from the text will be assigned weekly,  
collected, and spot-graded. The three lowest scores will be dropped.
- 40 % Laboratory work  
Details given below

**Letter Grades** (A-F) will appear on the transcripts of all students that are enrolled after the **Drop Date**, January 25. The last day to change to or from the **Credit/No-Credit** grading basis is February 8.

A  $\geq$  90 %, B 80-89 %, C 70-79 %, D 60-69 % and F  $\leq$  59 %

**Lecture Topics** will follow the order of presentation in Tro, and are paired with relevant laboratory work:

- chapter 12 Solutions — review of physico-chemical units and conversions
- 13 Chemical Kinetics — reaction mechanisms and catalysis
- 14 Chemical Equilibrium — the law of mass action and Le Châtelier's Principle
- 15 Acids and Bases — Arrhenius, Brønsted, Lewis
- 16 Aqueous Ionic Equilibrium — buffers and all that
- 17 Free Energy and Thermodynamics — the direction of spontaneous change
- 18 Electrochemistry — driving reactions backwards

## TERMS AND CONDITIONS

**Attendance** in lecture and lab is mandatory and will be recorded. Unexcused absence from four consecutive lectures, or four consecutive lab sessions, automatically earns a failing grade for the course. Always inform the instructor in advance if you expect to be absent. A student who is asked to leave because of disruptive behavior is regarded as absent.

The grade for a missed exam or lab quiz (no-show) will be *zero* unless alternative arrangements have been made *in advance*. If you must miss a quiz or exam, inform the Instructor ahead of time. The possibility of make-up exams will be evaluated on a case-by-case basis.

**Supplemental materials** are available in the labs, PHY 77 and PHY 82:

- 1) <http://www.masteringgeneralchemistry.com>  
an Access Code is included with your textbook.
- 2) Fine et al. *Chemistry for Scientists and Engineers*
- 3) Ebbing and Gammon *General Chemistry*  
Text is available on disk.
- 4) *General Chemistry 1B*, Knowledgebase Series  
Tutorial Disks are installed on the computers in PHY 82.

**Plagiarism and fraudulent behavior** during quizzes or exams earns a grade of *zero*. Copying of homework, experimental data, or lab reports is considered fraudulent on the part of both parties involved, and is graded *zero*. Students are encouraged to collaborate, and to use the literature of chemistry (online and shelfware), but handing in someone else's work as your own is plagiarism.

**Academic accommodation for students with disabilities.** If you have a verified need for an academic accommodation or materials in alternative media (i.e. Braille, large print, electronic text, etc) — as per the Americans with Disabilities Act (ADA) or Section 504 of the Rehabilitation Act — please contact the Instructor as soon as possible.

**Canceled class notification.** Unscheduled cancellations will be posted on the door of PHY 82.

Student and Instructor rights and responsibilities are spelled out in the Reedley College Catalog. <http://www.reedleycollege.edu/RCcatalog/catalogsRC.htm>

## LABORATORY

**Ground Rules** for all laboratory work:

- 1) An Instructor must be present
- 2) Students and Instructors must wear approved eye protection (safety goggles) and closed-toe shoes
- 3) Eating and drinking are forbidden.

Violators must be asked to leave and recorded as absent.

**Required Materials:** lab manual, safety goggles, lab coat, calculator

**Grading** Lab work constitutes 40 % of the final Chem 1B grade.  
Graded laboratory work is further subdivided as follows

- 40 % Lab reports
- 30 % Lab quizzes
- 30 % Research project

**Preparation** is essential if the laboratory work is to be completed safely, and with understanding. The pre-lab exercise from the lab manual therefore constitutes 20 % of each lab report grade. In order to be graded for full credit, pre-labs must be turned in before the lab discussion begins, and lab reports must be turned in at the end of the lab session. A late pre-lab or lab report is worth half of its original value for one week, and *zero* thereafter.

**Make-up labs.** The grade for a lab no-show will be *zero* unless alternative arrangements have been made in advance. So if you must miss a lab session, inform the Instructor ahead of time. The possibility of make-up labs will be evaluated on a case-by-case basis. As with late lab reports, make-up labs are worth half of full credit.

**Research Project.** The last weeks of the laboratory section are set aside for independent research projects, to be completed in teams of two. Students are encouraged to develop a project in line with their own interests. Subjects not covered in lecture or lab are welcome, but may require a longer lead time for the acquisition of experimental supplies. The complete project will include

- literature review (at least 5 academic references)
- laboratory experiments (~3 lab sessions)
- written report (at least 4 pages)
- short presentation (5 minutes with illustrations).

The Instructor will provide a written list of project ideas, and guidelines for the final report format.

SCHEDULE Chemistry 1B Spring 2008

week	date	Lecture	Tro	Lab	unit
1	January 8 10	Introduction	12	Safety oath, check-in	
		Solutions Review		Solutions Handout	extra
2	15 17	Chemical Kinetics	13	Reaction Kinetics	32
				Iodine Clock Reaction	33
3	22 24	(trial exam)		Spectrophotometric Rate Law	34
				<b>Lab Quiz 1</b>	
4	29 31	<b>Exam 1</b>		Chemical Equilibrium	35
				...continued	35
5	February 5 7	Chemical Equilibrium	14	Equilibrium Constants	36
				...continued	36
6	12 14	Acids and Bases	15	Complex Ion Formation Constant	37
				Polyprotic Acid Handout	extra
7	19 21	<b>Exam 2</b>		<b>Lab Quiz 2</b>	
				Qualitative analysis, group 1	42
8	26 28	Aqueous Equilibrium	16	group 2	43
				group 3	44
9	March 4 6			continue 3	44
				groups 4 and 5	45
10	11 13	<b>Exam 3</b>		General Unknown	46
				...continued	46
	18 20	<b>SPRING BREAK</b>			
11	25 27	Thermodynamics	17	<b>Lab Quiz 3</b>	
				Thermochemistry	38
12	April 8 10			Gibbs Free Energy	39
				...continued	39
13	15 17	Electrochemistry	18	Electrochemistry	41
				Research Project: proposal	
14	22 24	<b>Exam 4</b>			
				first-draft reports	
15	May 1 29	Special Topic TBA			
				Presentations	
16	6 8	Review		Presentations <b>reports</b> checkout	
17	13	<b>Final Exam PHY 82 11:00 AM - 1:00 PM</b>			4