

CHEMISTRY 103
FALL 2008
Sections 1 and 2 (MWF 11:00 and 12:00)
Syllabus

Week beginning...	Topic	Pages in Zumdahl
	I. Chemical Foundations (Chapter 1)	
Aug 25	A. Domain and methods of chemistry B. Techniques of calculation	1-7, 25-28 8-25, A1-A13
	II. Atoms, Molecules, and Ions (Chapter 2 and 7)	
Sept 1	A. Early chemical laws B. Dalton's atomic theory C. Atoms and subatomic particles D. Electromagnetic radiation and quantization	39-43 43-45 45-52, 55-57 275-285
Sept 8	E. The hydrogen atom 1. Bohr's atomic model 2. Quantum mechanics and the Schrödinger equation F. Polyelectronic atoms 1. Pauli principle 2. Electron filling in atoms	285-290 290-296 296-298 298-299, 302-309
Sept 15	G. Molecules and ions	52-55, 57-67
	III. Chemical Quantities (Chapter 3)	
	A. Atomic mass B. The mole and Avogadro's number C. Molar mass D. Empirical and molecular formulas	77-81 82-85 86-88 89-96
	IV. Chemical Reactions (Chapters 3 and 4)	
Sept 22	A. Chemical equations B. Stoichiometric calculations C. Solution stoichiometry D. Precipitation and acid-base reactions E. Oxidation-reduction reactions	96-102 102-113 127-140 140-154 154-168
	V. Gases (Chapter 5)	
Sept 29	A. Laws of Avogadro, Boyle, and Charles B. Ideal gas law and Dalton's law C. Kinetic molecular theory D. Effusion and diffusion	179-186 186-211 199-206 206-208
Oct 6	E. Real gases	208-211
	VI. Thermochemistry (Chapter 6)	
Oct 13	A. Heat, work and energy B. Enthalpy, calorimetry and Hess's law C. Standard enthalpies of formation	229-235 235-246 246-252

Pages in

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Week beginning...	Topic	Zumdahl
	VII. Polyelectronic Atoms (Chapter 7)	
	A. Periodic table and periodic trends	299-302, 309-318
	VIII. Chemical Bonding (Chapter 8)	
Oct 20	A. Electronegativity and bond polarity	329-338
	B. Ionic compounds	338-344
	C. Covalent compounds	346-353
Oct 27	D. Lewis dot structures, resonance	353-367
	E. Valence shell electron pair repulsion model	367-379
	IX. Liquids and Solids (Chapter 10)	
Nov 3	A. Intermolecular forces	425-429
	B. Liquids	127-129, 429-430, 459-466
	C. Solids	430-459
	D. Phase diagrams	467-471
	X. Colligative Properties of Solutions (Chapter 11)	
Nov 10	A. Concentration measurements and solubility	485-492
	B. Raoult's and Henry's laws	493-495, 497-504
	C. Boiling-point elevation and freezing-point depression	504-507
	D. Osmotic pressure	507-512
	XI. Chemical Kinetics (Chapter 12)	
Nov 17	A. Reaction rates	527-532
	B. Rate laws	532-538
	C. First-order reactions	538-543
	D. Kinetics and mechanism	549-557
	E. Catalysts	557-563
	XII. Chemical Equilibrium (Chapter 13)	
Nov 24	A. Equilibrium and equilibrium constant	579-604
	B. Le Châtelier's Principle	604-610
	XIII. Acids and Bases (Chapters 14 and 15)	
Dec 1	A. Nature of acids and bases	623-631, 149-154
	B. pH scale	631-635
	C. Equilibrium calculations for weak acids and bases	635-655
	D. Hydrolysis of salts of weak acids and bases	655-660
	E. Common ion effect and buffers	681-696

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Text: S. S. Zumdahl & S. A. Zumdahl, *Chemistry*, 7th Ed., Houghton Mifflin: Boston, MA (2007).

Optional supplements: T. J. Hummel, S. S. Zumdahl, & S. A. Zumdahl, *Student Solutions Guide*, Houghton Mifflin: Boston, MA (2003); P. B. Kelter, *Study Guide*, Houghton Mifflin: Boston, MA (2003).

Instructor:	<u>Sec.</u>	<u>Office</u>	<u>Phone</u>	<u>Office Hours*</u>	<u>E-Mail</u>
J. C. Poutsma	1&2	ISC 1054	221-2548	T (9:30-11); R (1-2:30)	jcpout@wm.edu

* Please note that office visitations are not necessarily restricted to these times, additional times can be arranged by appointment.

Course Goals: This course is intended for science concentrators and pre-medical students. It introduces the student to the nature of atoms and molecules, stoichiometry, states of matter, solutions, reactions, kinetics and equilibrium.

Lectures: Section 1 – Monday, Wednesday, Friday, 11:00-11:50 AM., Rogers Hall 100
Section 2 – Monday, Wednesday, Friday, 12:00-12:50 AM., Rogers Hall 100

Examinations: The three tests and the final exam will have (i) problems requiring numerical answers similar to the problems in the problem sets, (ii) short-answer questions, and (iii) multiple-choice questions. The final exam will cover material from the entire course, with added emphasis given to the subject matter for the final section of the syllabus.

Grading:	Syllabus	Chapters in	Date
	<u>Topics</u>	<u>Zumdahl</u>	
18% First Test	I – IV	1 – 4, 7	Oct 3 (Friday)
18% Second Test	V – VIII	5 – 7	Oct 24 (Friday)
18% Third Test	VII – XII	8, 10 – 12	Nov 21 (Friday)
10% Problem Sets	----	----	----
36% Final Exam	I-XIV	1-8, 10-15	Section 1: Dec 17 (8:30 AM) Section 2: Dec 9 th (8:30 AM)

Problem Sets: Working problems is important for reinforcing the chemical principles emphasized in the lecture and text. There are 14 problem assignments for the semester listed on the back of this page. These problem sets are to be done through WebAssign. Each problem set is due by 5:00 PM on the day indicated. Each problem set will be automatically graded through WebAssign. To help with the learning process, you get three tries to get correct answers for each problem set. The problem set deadlines are firm; no extensions will be given. You may work in small groups; however each student is ultimately responsible for mastering the material for him/herself. Solutions to the assigned problems will be posted on WebAssign after the problem set is due.

You will receive 1% toward your final grade for each successfully completed problem set, for up to 10 sets. A successfully completed problem set is one on which the student scores $\geq 75\%$. Since 4 of the 14 sets can be missed without affecting the problem set component of the grade no problem sets will be accepted late

There are numerous problems and exercises within and at the end of each chapter, as well as the optional *Study Guide*. Solutions to the odd (blue) numbered end-of-chapter problems are found in the back of the text and detailed solutions to these problems are found in the optional *Solutions Guide*. Many of these blue problems are very similar to the assigned problems in the homework sets. You should practice similar blue problems if you are having difficulty with an assigned problem. For your convenience, a list of suggested blue practice problems from the text is provided on the back of this page.

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WebAssign Problem Sets (graded)

Problem Set #	Chapter(s)	Date Available	Date Due
1	1	Aug. 27 th 8:00 AM	Sept. 1 st 5:00 PM
2	2	Sept. 1 rd 8:00 AM	Sept. 5 th 5:00 PM
3	7	Sept. 5 th 8:00 AM	Sept. 12 th 5:00 PM
4	2,3,7	Sept. 12 th 8:00 AM	Sept. 19 th 5:00 PM
5	4	Sept. 19 th 8:00 AM	Sept. 26 th 5:00 PM
6	4,5	Sept. 26 th 8:00 AM	Oct. 3 rd 5:00 PM
7	5	Oct. 3 rd 8:00 AM	Oct. 10 th 5:00 PM
8	6	Oct. 10 th 8:00 AM	Oct. 17 th 5:00 PM
9	6,7	Oct. 17 th 8:00 AM	Oct. 24 th 5:00 PM
10	8,10	Oct. 24 th 8:00 AM	Oct. 31 st 5:00 PM
11	10	Oct. 31 st 8:00 AM	Nov. 7 th 5:00 PM
12	11	Nov. 7 th 8:00 AM	Nov. 14 th 5:00 PM
13	12	Nov. 14 th 8:00 AM	Nov. 21 st 5:00 PM
14	13-15	Nov. 21 st 8:00 AM	Dec. 5 th 5:00 PM

Additional Practice Problems (not graded)

Chapter	Problems
1	27, 33, 39, 51, 55, 61, 65, 67, 83
2	27, 35, 37, 47, 49, 53, 55, 59, 61, 65
3	29, 33, 39, 41, 51, 61, 63, 83, 89, 105
4	21, 23, 27, 29, 31, 51, 63, 67(a,b,e,f,h), 71, 73
5	37, 43, 47, 61, 65, 71, 77, 83, 87, 101
6	21, 25, 33, 37, 41, 49, 53, 61, 71, 77
7	27, 39, 45, 59, 63, 65, 69, 73, 83, 85, 89, 95, 117
8	13, 25, 33, 39, 57, 61, 67, 73, 79, 87
10	25, 29, 35, 81, 83
11	25, 27, 29, 49, 53, 67
12	25, 29, 43, 53, 55
13	23, 31, 37, 41, 53, 57, 61
14	29, 31, 33, 37, 41, 49, 51, 55, 57, 73, 85
15	21, 23, 27, 33

Help Sessions: Additional group help will be available from one of the instructors every Thursday from 5:30-7:00 p.m. in Rogers 100. These sessions are intended to provide help on topics and problems discussed in class for which you feel additional time is needed to increase your understanding. Additional help sessions and office hours will be announced near the test and final exam dates.

How to Log into WebAssign: Go to WebAssign.net. Click on "Log In". Enter the following:

Username = your W&M email name without the @wm.edu part, e.g. rdpike, jcpout, etc.

Institution = wm

Password = your nine digit student number. You might wish to change your password once you've logged in. Log in and enter your access code (purchased from the bookstore). You should now see your assignments.