CHEMISTRY 103
FALL 2009
Sections 1 and 2 (MWF)
Syllabus

Week beginning...	Topic	Pages in McMurray & Fay
	I. Matter & Measurement (Chapter 1)	
Aug 26	A. Domain and methods of chemistry	3-4
	B. Calculations: units, digits and uncertainty	12-28, A1-A8
	II. Atomic Structure (Chapter 2)	
Aug 31	A. Early chemical laws	37-41
	B. Modern atomic structure	41-47
	C. Atomic mass, Avogadro's number and the mole	47-50
	III. Electronic Structure and the Periodic Table (Chapter 3)	
Sept 7	A. Electromagnetic radiation and quantization	63-66
	B. The Bohr atom and atomic line spectra	66-72,80-81
	C. Quantum mechanics and hydrogen-like orbitals	72-79,82
Sept 14	D. Periodic table and electron filling in atoms	82-89
	E. Periodic trends	89-91,106-115
	IV. Ionic Bonding (Chapter 4)	
	A. Electronegativity and bond polarity	141-142
	B. Ions and ionic bonding	99-105
Sept 21	C. Ionic nomenclature and polyatomic ions	117-122
	V. Covalent Bonding (Chapter 5)	
	A. Covalent compounds	135-139
	B. Covalent nomenclature	142-143,234
Sept 28	C. Lewis dot structures, resonance	142-149,153-157
	D. Valence shell electron pair repulsion model	157-165
	VI. Chemical Reaction Stoichiometry (Chapter 6)	
	A. Chemical equations	189-193
	B. Stoichiometric calculations	193-202
	C. Solution stoichiometry	202-208
Oct 5	D. Percent composition and empirical formula	208-214
	VII. Chemical Reaction Types (Chapter 7)	
	A. Electrolytes, ions and net ionic equations	225-232
	B. Precipitation and acid-base reactions	230-236
	C. Oxidation-reduction reactions	236-252

Week beginning...	Topic	Pages in McMurray & Fay
	VIII. Thermochemistry (Chapter 8)	
	A. Heat, work and energy	263-269
Oct 12	B. Enthalpy, calorimetry and Hess's law	269-280
	C. Standard enthalpies of formation	281-287
	IX. Gases (Chapter 9)	
Oct 19	A. Gas pressure and the kinetic molecular theory	305-309,322-325
	B. Gas laws	309-322
	C. Effusion and diffusion	325-327
Oct 26	D. Real gases	327-328
	X. Liquids and Solids (Chapter 10)	
	A. Intermolecular forces	343-353
	B. Liquids	353-362
Nov 2	C. Solids	362-376
	D. Phase diagrams	376-378
	XI. Solutions (Chapter 11)	
	A. Concentration measurements and solubility	389-403
Nov 9	B. Raoult's and Henry's laws	403-409
	C. Boiling-point elevation and freezing-point depression	409-413
	D. Osmotic pressure	413-420
	XII. Chemical Kinetics (Chapter 12)	
	A. Reaction rates	429-434
	B. Rate laws and reaction order	434-440
	C. First-order reactions	441-449
Nov 16	D. Kinetics and mechanism	454-470
	E. Catalysts	470-476,520-521
	XIII. Chemical Equilibrium (Chapter 13)	
Nov 23	A. Equilibrium and equilibrium constant	491-510
	B. Le Châtelier's Principle	510-519
	XIV. Acids and Bases (Chapters 14 and 15)	
	A. Nature of acids and bases	537-545, 232-236
Nov 30	B. pH scale	546-551
	C. Equilibrium calculations for weak acids and bases	551-559,562-565
	D. Acid-base properties of salts	566-573
	E. Common ion effect and buffers	587-601

Chemistry 103 - Sections 1 and 2 **3**
Fall 2009

Text: J. E. McMurray & R. C. Fay, *General Chemistry: Atoms First*, Pearson Prentice Hall: Upper Saddle River, NJ, ISBN: 9780321633644 (2009). Package includes *Mastering Chemistry* access code.

Optional supplement: J. McMurry, J. Topich, R. Topich, *Selected Solutions Manual for General Chemistry: Atoms First*, Pearson Prentice Hall: Upper Saddle River, NJ, ISBN: 9780321560254 (2009).

Instructors:	Sec.	Office	Phone	Office Hours*	E-Mail
J. C. Poutsma	1	ISC 1054	221-2548	M (1:30–3); R (1–2:30)	jcpout@wm.edu
Robert Pike	2	ISC 2035	221-2555	T (9:30–11); R (2:30–4)	rdpike@wm.edu

* Please note that office visitations are not necessarily restricted to these times or to your particular professor since the same syllabus, problem assignments, and course structure are being used in both sections. Additional times 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, ISC 1127
Section 2 − Monday, Wednesday, Friday, 12:00-12:50 PM, ISC 1127

Examinations: The four 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 slightly added emphasis given to the subject matter for the final section of the syllabus.

Grading:		**Syllabus Topics**	**Chapters in Textbook**	**Date**
13%	First Test	I − III	1 − 3	Sept 21 (Monday)
14%	Second Test	IV − VII	4 − 7	Oct 16 (Friday)
14%	Third Test	VIII − X	8 − 10	Nov 6 (Friday)
14%	Fourth Test	XI − XIII	11 − 13	Nov 23 (Monday)
35%	Final Exam	Course & XIV	Course & 14 − 15	Section 1: Dec 14 (9:00 AM) Section 2: Dec 17 (9:00 AM)

Homework Sets: Working problems is important for reinforcing the chemical principles emphasized in the lecture and text. There are 13 problem assignments for the semester listed on the back of this page. These problem sets are to be done through Mastering Chemistry (MC). Each problem set is due by 5:00 PM on the day indicated. Each problem set will be automatically graded through MC. 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 available on MC 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 MC problem set is one on which the student scores ≥75%. Since 3 of the 13 sets can be missed without affecting the problem set component of the grade, no MC problem sets will be accepted late. One point of extra homework credit is available by taking the diagnostic exams (see below).

Practice Problems: There are numerous problems and exercises within and at the end of each chapter. Solutions to the (red) odd 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 red problems are very similar to those assigned in the homework sets. You should practice related red problems if you are having difficulty with an assigned problem. A list of suggested red problems is provided on the back of this page. Many of these problems are included on practice sets on MC. The MC practice sets also contain tutorials to help you learn the material in an interactive context. The MC Practice Sets do not count for credit in the course.

MC Homework Sets (graded)

Problem Set #	Chapter(s)	Date Available	Date Due
Diagnostic Exam (through Blackboard)		Aug. 26th 8:00 AM	Sept 2nd 5:00 PM
1	2	Aug. 28th 8:00 AM	Sept. 4th 5:00 PM
2	3	Sept. 4th 8:00 AM	Sept. 11th 5:00 PM
3	3 & 4	Sept. 11th 8:00 AM	Sept. 18th 5:00 PM
4	4 & 5	Sept. 18th 8:00 AM	Sept. 25th 5:00 PM
5	5 & 6	Sept. 25th 8:00 AM	Oct. 2nd 5:00 PM
6	7	Oct. 2nd 8:00 AM	Oct. 9th 5:00 PM
7	8	Oct. 9th 8:00 AM	Oct. 16th 5:00 PM
8	8 & 9	Oct. 16th 8:00 AM	Oct. 23rd 5:00 PM
9	9 & 10	Oct. 23rd 8:00 AM	Oct. 30th 5:00 PM
10	10	Oct. 30th 8:00 AM	Nov. 6th 5:00 PM
11	11 & 12	Nov. 6th 8:00 AM	Nov. 13th 5:00 PM
12	12 & 13	Nov. 20th 8:00 AM	Nov. 30th 5:00 PM
13	14 & 15	Nov. 30th 8:00 AM	Dec. 4th 5:00 PM
Diagnostic Exam (through Blackboard)		Nov. 30th 8:00 AM	Dec 14th 5:00 PM

Additional Practice Problems (not graded)

Chapter	Problems
1	7, 51, 52, 60, 61, 62, 68, 70, 78, 88, 90, 91, 102, 106, 107
2	30, 32, 40, 42, 44, 48, 50, 68, 76
3	22, 32, 34, 44, 56, 58, 66, 68, 70, 78, 86, 96, 108
4	30, 32, 34, 40, 54, 62, 74, 76, 80, 90, 98
5	46, 48, 52, 56, 58, 66, 70, 78, 80, 82, 84, 102
6	36, 38, 40, 48, 50, 54, 58, 60, 66, 68, 72, 76, 78, 80, 86, 88, 92, 94, 100, 108, 124
7	32, 34, 38, 40, 42, 54, 56, 60, 64, 66, 72, 74, 78, 84, 102
8	38, 54, 58, 62, 68, 70, 76,110
9	38, 46, 48, 50, 54, 64, 66, 70, 88, 94, 98, 106
10	26, 30, 32, 34, 36, 40, 42, 50, 58, 72, 74, 80, 82, 86, 88, 100
11	32, 40, 42, 46, 54, 56, 60, 68, 70, 72, 78, 82, 88, 96, 108
12	26, 32, 40, 48, 58, 100, 142
13	30, 34, 36, 48, 50, 52, 62, 68, 70, 72, 80, 82, 82, 96
14	44, 46, 52, 56, 60, 62, 64, 66, 70, 72, 82, 86, 94, 124
15	60, 62, 64, 66

Diagnostic Exams: As part of the College's assessment of the effectiveness of its introductory courses, we would like students to take part in a diagnostic exam at the beginning and the end of Chem 103. The diagnostic exam is available through Blackboard (NOT MC). Students who complete BOTH the pre- and post-course diagnostic exams will get credit for one extra problem set. As a result students can accrue credit for 11 homework sets (1% extra credit for the course) if they complete at least 10 MC homework sets and both diagnostic exams. Student scores on the diagnostic exams do not count toward course grades.

Help Sessions: Additional group help will be available from one of the instructors every Thursday from 6:00-7:00 p.m. in ISC 1127. 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 access MC: Go to http://www.masteringchemistry.com. Click on "New Students" and follow the instructions. You will need to enter your access code, which is part of the textbook package. If you have purchased a used textbook, you will need to buy an access code on-line. More details are provided in the Mastering Chemistry handout that is posted on Blackboard.