

CHEMISTRY 103
FALL 2011
Sections 1 and 2 (MWF)
Syllabus

Week beginning...	Topic	Pages in McMurray & Fay
	I. Matter & Measurement (Chapter 1)	
Aug 22	A. Domain and methods of chemistry	3-4
	B. Calculations: units, digits and uncertainty	12-28, A1-A8
	II. Atomic Structure (Chapters 2 and 6)	
Aug 29	A. Early chemical laws	37-41
	B. Modern atomic structure	41-47
	C. Atomic mass, Avogadro's number and the mole	47-50
	D. Percent composition and empirical formula	208-214
	III. Electronic Structure and the Periodic Table (Chapter 3)	
Sept 5	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 12	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
Sept 19	B. Ions and ionic bonding	99-105
	C. Ionic nomenclature and polyatomic ions	117-122
	V. Covalent Bonding (Chapter 5)	
	A. Covalent compounds	135-139
Sept 26	B. Covalent nomenclature	142-143,234
	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 3	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. Gases (Chapter 9)	
Oct 10	A. Gas pressure and the kinetic molecular theory	305-309,322-325
	B. Gas laws	325-327
	C. Effusion and diffusion	309-322
	D. Real gases	327-328
	IX. Thermochemistry (Chapter 8)	
Oct 17	A. Heat, work, energy, enthalpy and calorimetry	263-269
	B. Hess's law	269-280
	C. Standard enthalpies of formation	281-283
Oct 24	D. Bond dissociation energies	284-287
	X. Liquids and Solids (Chapter 10)	
	A. Intermolecular forces	343-353
Oct 31	B. Liquids	353-362
	C. Solids	362-376
	D. Phase diagrams	376-378
	XI. Solutions (Chapter 11)	
Nov 7	A. Concentration measurements and solubility	389-403
	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
Nov 14	C. First-order reactions	441-449
	D. Kinetics and mechanism	454-470
	E. Catalysts and temperature effects	470-476,520-521
	XIII. Chemical Equilibrium (Chapter 13)	
Nov 21	A. Equilibrium and equilibrium constant	491-510
	B. Le Châtelier's Principle	510-519
	XIV. Acids and Bases (Chapters 14 and 15)	
Nov 28	A. Nature of acids and bases	537-545, 232-236
	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

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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	T (1–2:30); F (9–10:30)	jcpout@wm.edu
Doug Young	2	ISC 2037	221-2539	W (9:30–11); R (10:30–12)	dyoung01@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 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 slightly added emphasis given to the subject matter for the final section of the syllabus.

Grading:	Syllabus <u>Topics</u>	Chapters in <u>Textbook</u>	<u>Date</u>
18% First Test	I – IV	1 – 4	Sept 21 (Wednesday)
18% Second Test	V – VII	5 – 7	Oct 17 (Monday)
18% Third Test	VIII – XI	8 – 11	Nov 18 (Friday)
36% Final Exam	Course XII-XIV added emphasis	Course	Section 1: Dec 5 (9:00 AM) Section 2: Dec 8 (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. 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 $\geq 75\%$. 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.

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
1	2 & 6	Aug. 26 th 8:00 AM	Sept. 2 nd 5:00 PM
2	3	Sept. 2 nd 8:00 AM	Sept. 9 th 5:00 PM
3	3 & 4	Sept. 9 th 8:00 AM	Sept. 16 th 5:00 PM
4	4 & 5	Sept. 16 th 8:00 AM	Sept. 23 th 5:00 PM
5	5 & 6	Sept. 23 th 8:00 AM	Oct. 30 th 5:00 PM
6	7	Sept. 30 th 8:00 AM	Oct. 7 th 5:00 PM
7	9	Oct. 7 th 8:00 AM	Oct. 17 th 5:00 PM
8	8 & 9	Oct. 14 th 8:00 AM	Oct. 21 st 5:00 PM
9	8 & 10	Oct. 21 st 8:00 AM	Oct. 28 th 5:00 PM
10	10	Oct. 28 th 8:00 AM	Nov. 4 th 5:00 PM
11	11 & 12	Nov. 4 th 8:00 AM	Nov. 11 th 5:00 PM
12	12 & 13	Nov. 11 th 8:00 AM	Nov. 18 th 5:00 PM
13	14 & 15	Nov. 18 th 8:00 AM	Dec. 2 nd 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(a,b,d), 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, 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

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. The Course ID is WMCHEM103MWF.