

**CHEMISTRY 103 -- FALL 2011**  
**Section 3 (Tuesday, Thursday 11-12:20; ISC 1127)**  
**SYLLABUS**

Students! Welcome to William and Mary and to Chemistry 103.

Please note that all announcements pertaining to the course will appear on Blackboard (in addition to my announcing them in class).

**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.

**Instructor:** Carey Bagdassarian (Office: ISC 1058; Email: ckbagd@wm.edu)

**Office hours:** Monday 2-3:30; Tuesday 2-3:30

**Optional Weekly Help Sessions:** Every Tuesday from 8-9 pm in ISC 1127. Prior to exams, additional sessions will be announced.

**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).

**Examinations:** There will be three in-class exams and a final. The final exam will cover material from the entire course, with slightly more emphasis on material from the final section of the syllabus.

**Grading:**

20%	First Test	Sept 22
20%	Second Test	Oct 18
20%	Third Test	Nov 17
30%	Final Exam	Dec 9 (2:00 pm)
10%	Homework Sets	

**Homework Sets:** Working problems is absolutely crucial!! There are 13 problem sets for the semester listed on the back of this syllabus. These problem sets are to be done through Mastering Chemistry (MC). The due date and time (and the availability date) of each problem set will be announced in class, and you will have ample time to work each. Regardless of due date, the problem sets will always be due at 5:00 pm. The problem sets will be automatically graded through MC. To help with the learning process, you get three tries to get a correct answer 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 you score  $\geq 75\%$ . 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 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 at the back of this syllabus. 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. Practice problems do not count for credit in the course.

**Super-Special Problems:** These will be available – along with an answer key – on Blackboard. Note that these problems are written by me and so will give you a sense of how I might ask some of the exam questions. And though there will not be many of these super-special problems, I strongly urge you to work them!!! They will help you understand the material, my style of questioning, and what I consider a complete answer. These problems are not graded.

**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 WMCHEM103TR.

<b>Topic</b>	<b>Pages in McMurray &amp; Fay</b>
I. Matter & Measurement (Chapter 1)	
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)	
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)	
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
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
C. Ionic nomenclature and polyatomic ions	117-122
V. Covalent Bonding (Chapter 5)	
A. Covalent compounds	135-139
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
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
VIII. Thermochemistry (Chapter 8)	
A. Heat, work, energy, enthalpy and calorimetry	263-269
B. Hess's law	269-280
C. Standard enthalpies of formation	281-283
D. Bond dissociation energies	284-287
IX. Gases (Chapter 9)	
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
X. Liquids and Solids (Chapter 10)	
A. Intermolecular forces	343-353
B. Liquids	353-362
C. Solids	362-376
D. Phase diagrams	376-378
XI. Solutions (Chapter 11)	
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
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)	
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
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

**MC Homework Sets (graded)**

<b>Problem Set</b>	<b>Chapter(s)</b>	<b>Date Available</b>	<b>Date Due</b>
1	2 & 6	TBA 8:00 AM	TBA 5:00 PM
2	3	TBA 8:00 AM	TBA 5:00 PM
3	3 & 4	TBA 8:00 AM	TBA 5:00 PM
4	4 & 5	TBA 8:00 AM	TBA 5:00 PM
5	5 & 6	TBA 8:00 AM	TBA 5:00 PM
6	7	TBA 8:00 AM	TBA 5:00 PM
7	8	TBA 8:00 AM	TBA 5:00 PM
8	8 & 9	TBA 8:00 AM	TBA 5:00 PM
9	9 & 10	TBA 8:00 AM	TBA 5:00 PM
10	10	TBA 8:00 AM	TBA 5:00 PM
11	11 & 12	TBA 8:00 AM	TBA 5:00 PM
12	12 & 13	TBA 8:00 AM	TBA 5:00 PM
13	14 & 15	TBA 8:00 AM	TBA 5:00 PM

**Additional Practice Problems (not graded)**

<b>Chapter</b>	<b>Problems</b>
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