

CHEMISTRY 103
SUMMER 2018
Syllabus

Day	Topic	Pages in OpenStax
	I. Matter & Measurement (Chapter 1, Appendices B and C)	
May 29	A. Domain and methods of chemistry	1-29
	B. Calculations: units, digits and uncertainty	29-51, 1213-1222
	II. Atomic Structure (Chapters 2 and 6)	
May 30	A. Early chemical laws	67-78
	B. Modern atomic structure	78-86
	C. Atomic mass, Avogadro's number and the mole	307-310
May 31	D. Percent composition and empirical formula	311-318
	III. Electronic Structure and the Periodic Table (Chapter 3)	
June 1	A. Electromagnetic radiation and quantization	115-128
	B. The Bohr atom and atomic line spectra	128-134
	C. Quantum mechanics and hydrogen-like orbitals	134-148
June 4	D. Periodic table and electron filling in atoms	148-157
	E. Periodic trends	157-169
	IV. Ionic Bonding (Chapters 3 and 4)	
June 5	A. Electronegativity and bond polarity	199-203
	B. Ions and ionic bonding	169-172, 193-197
	C. Ionic nomenclature and polyatomic ions	172-177, 203-207
	V. Covalent Bonding (Chapter 4)	
June 6	A. Molecules and covalent bonding	197-199, 236-239
	B. Covalent nomenclature	207-210
	C. Lewis dot structures, resonance	210-217, 220-225
	D. Valence shell electron pair repulsion model	225-236
	VI. Chemical Reaction Stoichiometry (Chapters 6 and 7)	
June 7	A. Chemical equations	341-348
	B. Stoichiometric calculations	361-371
	C. Solution stoichiometry	318-326
	VII. Chemical Reaction Types (Chapters 7 and 11)	
June 11	A. Electrolytes, ions and net ionic equations	603-606, 346-348
	B. Precipitation and acid-base reactions	348-355
June 12	C. Oxidation-reduction reactions	355-361
	D. Titrations and gravimetry	371-378

Day	Topic	Pages in OpenStax
	VIII. Gases (Chapter 8)	
June 13	A. Gas pressure and the kinetic molecular theory	395-405, 435-440
	B. Diffusion and effusion	430-435
June 14	C. Gas laws	405-427
	D. Real gases	441-444
	IX. Thermochemistry (Chapters 9, 12, and 13)	
June 15	A. Heat, work, energy, enthalpy, and calorimetry	459-490
	B. Standard enthalpies of formation and Hess's Law	491-497
June 18	C. Bond dissociation energies	497-502
	D. Entropy and free energy	653-670, 706-708
	X. Liquids and Solids (Chapter 10)	
June 19	A. Intermolecular forces	519-532
	B. Liquids	532-549
	C. Solids	556-568
	D. Phase diagrams	549-556
	XI. Solutions (Chapters 6 and 11)	
June 20	A. Concentration measurements and solubility	326-331, 597-603
	B. Henry's and Raoult's laws	606-620
	C. Boiling-point elevation and freezing-point depression	620-627
	D. Osmotic pressure	627-633
	XII. Chemical Kinetics (Chapter 17)	
June 21	A. Reaction rates	895-904
	B. Rate laws and reaction order	904-911
June 25	C. First-order reactions	911-914, 918-920
	D. Kinetics and mechanism	921-933
	E. Catalysts and temperature effects	933-938
	XIII. Chemical Equilibrium (Chapter 13)	
June 26	A. Equilibrium and equilibrium constant	679-692, 695-706
	B. Le Châtelier's Principle	692-695
	XIV. Acids and Bases (Chapter 14)	
June 27	A. Nature of acids and bases	731-736
	B. pH scale	736-741
	C. Equilibrium calculations for weak acids and bases	742-758
	D. Acid-base properties of salts	760-764
	E. Common ion effect and buffers	771-779

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Text: E. J. Neth, P. Flowers, K. Theopold, R. Langley, W. R. Robinson, *Chemistry: Atoms First*, OpenStax: Houston, TX, ISBN: 9781938168154 (2016). <https://openstax.org/details/books/chemistry-atoms-first>

Instructor:	<u>Office</u>	<u>Phone</u>	<u>Office Hours</u>	<u>E-Mail</u>
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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: Monday through Friday ISC 1127, 8:00–9:30 AM

Examinations: Each of the three exams covers about a third of the course material and contains (i) problems requiring numerical answers similar to the problems in the problem sets, (ii) short-answer questions, and (iii) multiple-choice questions. Your weakest exam will be counted only half as much as your other two exams.

Grading:	<u>Syllabus Topics</u>	<u>Chapters in OpenStax</u>	<u>Date</u>
34%* First Test	I – V	1 – 4	June 8 (Friday)
34%* Second Test	VI – X	6 – 10, 12	June 22 (Friday)
34%* Third Exam	XI – XIV	11, 13, 14, 17	June 29 (Friday)
15% Homework Sets	(coverage and due dates on reverse side)		

*The weakest of the three exams will count only half as much (17%) as the other two (34% each).

Problem Sets: Working problems is important for reinforcing the chemical principles emphasized in the lecture and text.

Homework Sets: There are graded ten homework set assignments. The coverage and availability dates of the homework sets are listed on the reverse side of this page. These homework sets are available through *Sapling Learning*. Each set is due by 11:59 PM on the day indicated. Each set will be automatically graded through *Sapling*. To help with the learning process, you get three tries to get correct answers for each problem. The homework set deadlines are firm; no homework sets will be accepted late. 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 *Sapling* after the homework set is due.

Practice Problems: There are numerous problems and exercises within and at the end of each text chapter. Many of these problems are very similar to the assigned problems in the homework sets. You should practice these problems if you are having difficulty with an assigned problem. A suggested list for each chapter is given on the reverse side of this page.

Sapling Homework Sets (graded)

Problem Set #	Lecture Units	Date Available	Date Due
1	I, IIA	May 28 th 8:00 AM	June 2 nd 11:59 PM
2	IIB-D, IIIA-B	May 31 st 8:00 AM	June 2 nd 11:59 PM
3	IIIC-E, IV	June 4 th 8:00 AM	June 6 th 11:59 PM
4	V, VIA-B	June 6 th 8:00 AM	June 9 th 11:59 PM
5	VIC, VII	June 11 th 8:00 AM	June 13 th 11:59 PM
6	VII	June 13 th 8:00 AM	June 16 th 11:59 PM
7	IX, XA	June 18 th 8:00 AM	June 20 th 11:59 PM
8	XB-D, XI	June 20 th 8:00 AM	June 23 rd 11:59 PM
9	XII, XIII A	June 25 th 8:00 AM	June 27 th 11:59 PM
10	XIIIB, XIV	June 27 th 8:00 AM	June 29 th 11:59 PM

Additional Practice Problems (not graded)

Chapter	Problems
1	3, 9, 11, 13, 15, 17, 19, 23, 35, 37, 39, 45, 47, 49, 51, 53, 55, 59, 65, 71, 77, 81, 87, 89, 91, 93, 97
2	1, 3, 5, 7, 11, 17, 19, 25, 29, 37, 39, 41, 46, 45, 47, 49, 51, 53, 55, 57, 61
3	3, 5, 7, 9, 11, 15, 17, 19, 21, 23, 27, 33, 35, 37, 41, 45, 9, 53, 55, 57, 61, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 93, 97, 99
4	3, 5, 7, 9, 13, 15, 21, 23, 25, 27, 29, 31, 40, 46, 48, 50, 52, 66, 70, 72, 79, 85(a-e), 89, 91, 95, 99
6	3, 8, 12, 14, 18, 22, 26, 28, 30, 32, 36, 38, 40, 42, 46, 48, 52, 54
7	3, 5, 7, 9, 11, 13, 17, 19, 21, 25, 29, 31, 33, 37, 39, 41, 43, 45, 47, 51, 57, 61, 63, 65, 71, 73, 75, 79, 81, 83, 87, 89, 93
8	5, 7, 15, 27, 29, 31, 33, 37, 39, 43, 45, 49, 51, 53, 55, 57, 61, 63, 65, 69, 75, 81, 85, 87, 89, 91, 95(a,b), 101, 103
9	7, 9, 11, 19, 21, 23, 25, 27, 31, 41, 49, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71, 81, 88, 91, 92, 94, 100, 104
10	5, 7, 9, 11, 15, 21, 27, 35, 37, 39, 47, 51, 53, 55, 57, 65, 69, 73, 75, 77, 85
11	5, 9, 13, 15, 23, 25, 33, 35, 39, 41, 47, 49, 59, 65
12	3, 15, 17, 19, 21, 25, 31, 33, 37, 51
13	3, 5, 7, 9, 13, 15, 17, 33, 37, 39, 41, 45, 47, 49, 51, 53, 55, 65, 69, 73, 75, 77, 79, 81, 85, 87, 95
14	3, 5, 7, 9, 11, 19, 21, 25, 29, 33, 35, 47, 49, 61, 65, 67, 69(a-d), 71, 79(b-d), 87, 89, 91, 95, 97
17	3, 7, 13, 15, 19, 23, 25, 27, 29, 37, 45, 51, 53, 55, 63

How to access Sapling: Go to www.saplinglearning.com/login to log in or create an account.

- Under Enroll in a new course, you should see Courses at William & Mary. Click to expand this list and see courses arranged by subject. Click on a subject to see the terms that courses are available.
- Click on the term to expand the menu further (note that Semester 1 refers to the first course in a sequence and not necessarily the first term of the school year).
- Once the menus are fully expanded, you'll see links to specific courses. Click on the link for *College of William and Mary - CHEM 103 - Summer18 - Pike*.
- Review the system requirements and confirm that Flash is updated and enabled in your browser.