

CHEMISTRY 115 SCHEDULE
Spring Semester 2011-2012

PRINCIPLES OF CHEMISTRY

DATE	TOPICS	READING
Jan. 18-23	Stoichiometry Nomenclature of inorganic compounds, Law of chemical combination, Law of combining volumes, Mole concept, Formula, Chemical equations, Oxidation number, Equations of oxidation-reduction reactions, Stoichiometric calculations	Z: pp 15-44 101-107 117-124 52-79
Jan. 25-27	Gas Laws Boyle's law, Charles' law, Avogadro's Principle, Ideal gas law, Dalton's law of partial pressure, Kinetic theory of gases, Graham's law of effusion, van der Waals equation	Z: pp 141-176
Jan. 30- Feb 3	Thermochemistry Heat, Work, First law of thermodynamics, Enthalpy, Heats of reactions, Standard states, Heat capacity	Z: pp 359-401
Feb. 10 (Fri.)	FIRST REVIEW	
Feb. 6-15	Chemical Equilibrium Law of chemical equilibrium, Equilibrium calculation, Volume dependency, Temperature dependency, Equilibria in aqueous solutions, Chemical potential, Reaction free energy, Standard free energy, Standard entropy and the Third Law of Thermodynamics	Z: pp 196-223 410-460
Feb. 17-27	Structure of the Atom and Periodic Properties Models of the atom, Dual nature of light, Photoelectric effect, Line spectra, Bohr atom, Matter waves, Schrodinger wave equation, Hydrogen atom, Atomic orbitals, Electron density plots, Electron configuration, Periodic table, Atomic radii, Ionization energy, Electron Affinity	Z: pp 24-35 521-582
Mar. 16 (Fri.)	SECOND REVIEW	
Feb. 29- Mar.12	Spectrophotometry and Gravimetric Analysis Average deviation, Standard deviation, Significant Figures, Absorption spectrum, Beer-Lambert law, Deviations from Beer-Lambert law, Spectrophotometric method as an analytical tool, Solution calculations, Gravimetric procedure, Mechanism of precipitation, Calculations	Z: pp 90-100

Mar. 14-30	Structures and Bonding Octet rule, Ionic bond, Covalent bond, Multiple bonds, Lewis electron dot formula, Polar covalent bond, Electronegativity, Polarity of molecules, Exceptions to Octet rule, Molecular orbital theory, Application of MO theory for diatomic molecules, Valence bond theory, Hybridization, Multiple bonded molecules, Resonance, Coordination compounds (Valence bond theory), VSEPR theory (structure), Forces of Attraction between molecules	Z: pp 592-650 660-705 778-781
Apr. 6 (Fri.)	THIRD REVIEW	
Apr. 2-4	Solid and Liquid States Types of solids, Phase change: vapor pressure free energy, enthalpy, entropy, Types of crystals	Z: pp 781-835
Apr. 11-13	Nonelectrolytic Solutions Raoult's law, Deviation from Raoult's law, Henry's law, Colligative properties	Z: pp 846-875
Apr. 16-23	Equilibria in Aqueous Solutions Acids & bases, Bronsted-Lowry concept, Ionization of Water, pH & pOH, Ionization of weak acids, Ionization of weak bases, Conjugate acid-base pairs, Common ion effect, Factors Affecting strengths of acids and bases, Lewis concept, Solubility product	Z: pp 233-277 286-289 328-347
Apr. 25- May 2	Rates of Reactions Rate law, Order of reaction, Method of initial reaction rates, Theory of reaction rates, Multi-step reactions, Molecularity, Reaction mechanism, Reversible reactions	Z: pp 714-761
May 4 (Wed.)	FOURTH REVIEW	
May 9	Chemistry of the Representative Elements Alkali metals, Alkaline earth metals, Group IIIA (13), Group IVA (14), Group VA (15), Group VIA (16), Halogens (17), Noble gases (18), Oxides of representative elements	Z: pp 578-582 886-924

TEXTBOOK

Z: S. S. Zumdahl, "Chemical Principles," **6th Ed.**, Houghton Mifflin Co., Boston.

LABORATORY

Your laboratory section will meet one day a week either on Monday or Thursday.

NOTE - - - *Attendance is required.* In addition to the laboratory manual, "Principles of Chemistry Laboratory Manual," which is provided by the department, you will need a bound notebook. Your observations and calculations will be kept in this notebook. The laboratory reports are due *one week after completion of the experiment.*

LABORATORY SCHEDULE

Jan. 18, 19	Problem-Solving Strategies
Jan. 23, 26	Check-In
Jan. 30, Feb. 2	Exp. 2
Feb. 6, 9	Exp. 3
Feb. 13, 16	Exp. 4
Feb. 20, 23	Exp. 5 (Exp. 4 due)
Feb. 27, Mar. 1	Exp. 6 or 8 (Exp. 5 due)
Mar. 12, 15	Exp. 7 or 8 (Exp. 6 due)
Mar. 26, 29	Exp. 8 or 6 (Exp. 7 or 8 due)
Mar. 19, 22	Exp. 8 or 7 (Exp. 6 due)
Mar. 26, 29	Exp. 10 (Exp. 8 or 7 due)
Apr. 2, 5	Check-out (Exp. 10 due)

PROBLEM SETS

The following problem assignments will be due on the dates indicated. Answers for the blue problems are found at the end of Zumdahl. A problem session will be held at 4:30 pm each class day before the problem set is due. Attendance is **strongly encourage but not required.**

#1	Jan. 25	p 45: 46, 49 p 132: 56, 60a, b, c p 79: 31, 47, 50, 58, 72, 84, 91, 101, 106, 109
#2	Jan. 30	p 184: 42, 46, 62, 65, 73, 74, 84, 114, 125, 128, 134
#3	Feb. 6	p 402: 21, 36, 54, 56, 65, 70, 79, 80, Handout
#4	Feb. 20	p 224: 28, 33, 34, 53, 66, 75, 84, Handout p 461: 51, 67a, 94, 115, 119
#5	Feb. 29	p 583: 35a, 39, 55, 67(Sc - Cs), 85a,c,d, 87a,c,d, 100, 123, 135 Handout
#6	Mar. 21	Handout
#7	Mar. 28	p 651: 30, 37c, 39, 93, Draw the Lewis electron dot formula only of the following compounds: 51a-g, 54, 55, 59, 64, 71a & g, 79, 89 p 706: 31, 38

- #8 Apr. 4 p 651: Draw a representation of electron density clouds for the bonding molecular orbitals and predict molecular geometry, bond angles, and polarity: 51a-g, 54, 55, 71a & g, 79, 89
P 706: 63a & b Include orbital representation
p 836: 19d, 23
- #9 Apr. 18 p 837: 46, 84, 99, 100, 118, 119
p 876: 15, 19, 45, 49, 63, 70, 108, 109
- #10 Apr. 27 p 278: 23, 24, 39a & d, 49b, 50, 53, 56, 66a, 119, 126
p 348: 33, 35, 36, 88, 98, 105, 110
- #11 p 762: 17, 18, 21, 32, 43, 54, 60, 71, 98

*The lecture notes are available on the Web. Use a computer in one of the College's computer facilities, open web browser, and type "www3.davidson.edu/cms/x3628.xml." Click: **People** and then **Faculty and Staff**. Scroll to **W. Rodger Nutt** and click on **115-Principles of Chemistry**. The computer "**Experiments**" are also located at this Web site. The successful completion of each "**Experiment**" will result in the addition of one point to one of your Review grades.*

Course Grade

The course grade will be determined as follows:

4 Reviews	50%
Final Exam	25%
Laboratory	20%
Problem Sets	5%

All work submitted for a grade in this course must be your work. *The only exceptions are the Problem Sets.* Since you are encouraged to work with other members of your class when solving the problems in the Problem Sets, the Problem Sets may represent the joint efforts of those with whom you worked. **However, you may NOT copy the solutions to the problems from the papers of classmates or others who were enrolled in CHE 115.**

W. R. Nutt