General Chemistry
Chem 102
Spring 2012
Lecture TTh 6:30-7:45 pm Flanner 133
Discussion Th 8-8:50 pm Flanner 133

#	Day	Date	Topic	Chapter
1	Tu	1/17	Introduction – Intermolecular Forces	11
2	Th	1/19	Solutions	13
3	Tu	1/24	Solutions	13
4	Th	1/26	Kinetics	14
5	Tu	1/31	Kinetics	14
6	Th	2/2	Kinetics	14
	Th	**2/2**	**Quiz 1 on Solutions**	
7	Tu	2/7	Chemical Equilibrium	15
8	Th	2/9	Chemical Equilibrium	15
9	**Tu**	**2/14**	**Exam 1 on Solutions & Kinetics**	
10	Th	2/16	Chemical Equilibrium	15
11	Tu	2/21	Acid – Base Equilibria	16
12	Th	2/23	Acid – Base Equilibria	16
13	Tu	2/28	Acid – Base Equilibria	16
14	Th	3/1	Aqueous Equilibria	17
	Th	**3/1**	**Quiz 2 on Chemical & Acid – Base Equilibria**	
	Tu	3/6	Spring Break	
	Th	3/8	Spring Break	
15	Tu	3/13	Aqueous Equilibria	17
16	Th	3/15	Aqueous Equilibria	17
17	**Tu**	**3/20**	**Exam 2 – Chemical, Acid–Base & Aqueous Equilibria**	
	Th	3/22	Thermodynamics	19
18	Tu	3/27	Thermodynamics	19
19	Th	3/29	Thermodynamics	19
20	Tu	4/3	Electrochemistry	20
21	Th	4/5	Electrochemistry	20
	Th	**4/5**	**Quiz 3 on Thermodynamics**	
22	Tu	4/10	Coordination Chemistry	23
23	Th	4/12	Easter break	
24	**Tu**	**4/17**	**Exam 3 on Thermo. & Electrochemistry**	
25	Th	4/19	Coordination Chemistry	23
26	Tu	4/24	Nuclear Chemistry	21
27	Th	4/26	Nuclear Chemistry	21
	Th	**4/26**	**Quiz 4 on everything – ACS standardized test**	
	Tu	**5/1**	**Final Exam (50% on Electro. Coord & Nuclear; 50% on Exams 1-3)**	

Instructor: Dr. Ken Olsen
Flanner 409
Phone: 773-50**8-3121**
e-mail: kolsen@luc.edu

Office Hours: Tuesdays after class and by appointment.

Text: Brown, LeMay,et al. Chemistry – The Central Science, 12 edition

Website: The class website will be on the Blackboard system (blackboard.luc.edu). Handouts for the lectures will be posted there as pdf files readable with Adobe Reader or powerpoint ppt files. You should print the appropriate lecture handout before coming to lecture and use it to take notes. See the handout for information on this system.

E-Mail: I will be communicating via e-mail as well as in class. Be sure to check your e-mail regularly. Since I will send e-mails via Blackboard, which sends them to your Loyola e-mail address, you must have them forwarded to your other account if you don't regularly check your Loyola e-mail.

Grading: The grades will be determined from problem sets (homework, take-home and discussion section), quizzes, and examinations. The points available in each component are listed below.

Problems	100 (125 points possible with extra credit)
Quizzes	100
Examinations	300
Final Exam	200
Total	600 (See below)

The problems include the Mastering Chemistry homework, any (rare if any) take home problems and discussion problems. The discussion problems will be worked in groups. Up to 25 extra credit points can be earned by doing additional problems on Mastering Chemistry.

There will be four quizzes given during the discussion sections. Your lowest quiz will be dropped. The remaining three quizzes will account for 100 possible points towards the final grade.

There will be three regular examinations and a final examination. The final examination will be 50% on coordination chemistry and nuclear chemistry and 50% on the material covered in Exams 1 to 3. The total points possible on these examinations will be 400. If one of the regular examinations is the lowest score, it will be dropped and the final will count 200 points. If the final examination is the lowest score, then all four examinations will count 100 points each.

There will be no make-up hour examinations, quizzes or problem sets. If you miss a quiz then your quiz average will be calculated based on the three that you took. If you miss more than one quiz then your second miss will be a zero. If you miss an exam then it becomes the one that will be dropped and your final will count 200 points. Missing more than one test or quiz indicates that you have missed a substantial amount of the material and may not qualify for receiving credit in Chemistry 102.

You should read the appropriate chapter **before** class. Please realize that I will not have time to lecture on every topic but will emphasize what I consider to be the most important topics. Obviously, these more important topics will be emphasized on examinations but you are responsible for all of the text, lecture and discussion material.

It should be obvious that all answers on examinations must arise from independent, honest efforts. Nothing less is acceptable at Loyola. Thus, any student found cheating on any quiz or test will receive an automatic "0" for that examination and his (her) name will be brought to the attention of the Chair of the Department and the Dean of the College, who will decide if further disciplinary action is necessary.

Learning Objectives

The following topics will be emphasized:

1) Solution Properties. (Chap. 13) This section includes colligative properties (boiling and melting point elevation, vapor pressure lowering, and osmosis). Also included are solubility classification (saturated, super-saturated, unsaturated) and the thermodynamics of solubility. Concentration units (molality) and mole fraction would be covered as well.
2) Kinetics. (Chap. 14) This section includes a discussion of how reaction rates change as a function of concentration and temperature (Arrhenius equation). Rate laws will be discussed as well (0,1, and 2^{nd} order). Other subtopics include reaction coordinate diagrams, catalysis, and the collision model of reactions. There will be limited exposure to mechanisms.
3) Gas phase equilibria. (Chap. 15) Topics in this section include the principle of LeChatlier, writing equilibrium constants associated with homogenous and hetrogenous equilibria, and the law of mass action. Students will learn how to predict product and reactant concentrations at equilibrium.
4) The Chemistry of Acids and Bases. (Chap. 16) This section includes a description of strong and weak electrolytes and the classification of strong and weak acids and bases. The pH scale is introduced and students will learn to calculate equilibrium concentrations of species (using Ka's and Kb's) involved in acid and base equilibria of monoprotic species. Students will learn to recognize multiprotic and amphiprotic acids and bases and calculate the Ka's and Kb's associated with these species. Students will learn how to predict the pH and equilibrium concentrations involved in the reactions of these species of these species in some limited circumstances. Students will be introduced to reactions involving Lewis acids and bases. Students will learn how to write formation constants and predict equilibrium concentrations of reactants and products involved in Lewis equilibria.
5) Titrations and Solubility Equilibria. (Chap. 17) Students will learn how to draw titration curves associated with different monoprotic and monobasic species. Buffer equilibria will be stressed as well. Students will learn how to calculate equilibrium concentrations of weak electrolytes involved in solubility equilibria.
6) Free Energy and Spontaneous Processes. (Chap. 19) Students will be introduced to the concept of entropy and the second law of thermodynamics. Students will be taught the relationship of free energy and equilibrium constants.
7) Electrochemistry. (Chap. 20) Students will learn to balance complex redox reactions involving acids and bases. Students will be introduced to the concept of standard electrode potentials and how to recognize electrolytic and voltaic cells. Students will learn how to calculate cell potentials as a function of reactant and product concentrations using the Nernst equation. Students will be taught how to calculate redox equilibrium constants from standard cell potentials. Batteries and electrolysis will be covered as well.
8) Coordination Chemistry. (Chap. 23) Students will learn the geometries associated with different coordination complexes (tetrahedral, square planar, and octahedral) and how to recognize the structures of different linkage and geometric isomers. Crystal field theory will be covered as well.
9) Radiochemistry. (Chap. 21) This includes balancing fission, fusion, and transmutation reactions, mass-energy relationships, kinetics of nuclear decay, dating objects, and the characterization of biological radiation damage.