



GENERAL CHEMISTRY - CHEM 101

Second Semester 2010/2011 (092)

Lecture - 3 hours, Lab - 4 hours, Credit - 4 hours

Catalog Data:

This course is a survey course in chemistry. It involves the study of the matter, atomic structure and the periodic table, chemical bonding, stoichiometry of pure substances, reaction in aqueous solutions, state of matter (gasses, liquids, and solids), mixtures (with emphasis on some physical aspects of solutions), and thermochemistry. This course will give students general knowledge about theoretical and applied fundamental chemistry indispensable for an engineer and essential for understanding physico-chemical bases of practical processes and connection between chemical structure of materials, their physical and chemical properties and practical applications.

Prerequisite: MATH 002 or Equivalent.

Textbook (TB): Steven S. Zumdahl and Susan A. Zumdahl, "Chemistry", Houghton Mifflin, 7th Ed. 2007.

Lab Manual (LM): J. A. Beran, "Laboratry Manual for Principles of General Chemistry", John Wiley & Sons, 7th Ed. 2004.

Goals: The course is designed to:

1. Teach the basic principles of the scientific method of reasoning.
2. Equip the student with basic techniques for analysis and interpretation of data.
3. Present the essential material for historical development of the science of chemistry as part of the entire picture of science.
4. Familiarize the student with mathematical development of laws suitable for scientific and/or engineering problems.
5. Acquaint the student with literature and research tools to recognize that an experimental science such as chemistry plays in our lives.
6. Teach students to appreciate that chemistry is all around them.

Assessment Policy:	Weighting:	Letter Grading Scale:
Laboratory reports and quizzes	5%	95% - 100% A+
Mid-term Lab. Exam	10%	90% - 94% A
Final Lab. Exam	10%	85% - 89% B+
Quizzes and attendance	5%	80% - 84% B
First Major exam	20%	75% - 79% C+
Second Major exam	20%	70% - 74% C
Final examination	<u>30%</u>	65% - 69% D+
	100%	60% - 64% D
		0% - 59% F

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Date: 16-JAN-10

Approved: Dr. Mubarak Al-Mutairi
Assistant Dean, HBCC

Date:



- Essential Topics:**
1. Chemical Foundations
 2. Atoms, Molecules, and Ions
 3. Stoichiometry
 4. Types of Chemical Reactions and Solution Stoichiometry
 5. Gases
 6. Thermochemistry
 7. Atomic Structure and Periodicity
 8. Bonding - General Concepts
 9. Covalent Bonding - Orbitals
 10. Liquids and Solids
 11. Properties of Solutions

Laboratory

The laboratory part of the course will let the student see first-hand chemical principles and processes in action. It will also give him experience with some of the methods scientists use to do chemical research. The laboratory will consist of twelve experiments, which have qualitative and quantitative aspects of general chemistry with and supporting discussions in regular lectures.

Experiments:

- Expt. 1: The Laboratory and SI
- Expt. 2: Basic Laboratory Operation
- Expt. 3: Water Analysis
- Expt. 4: Percent of Water in a Hydrated Salt
- Expt. 5: Limiting Reactant
- Expt. 6: Molar Mass of a Volatile Liquid
- Expt. 7: Calorimetry
- Expt. 8: A Volumetric Analysis
- Expt. 9: Vinegar Analysis
- Expt. 10: Synthesis of Alum
- Expt. 11: Molecular Mass of a Solid

Homework

Chemistry is a quantitative science and understanding of its concepts is obtained by solving problems. The text and supplementary materials offer many problems. For success student should do as many of these as he can and if he runs into difficulties ask teaching fellow or professor, in email, office hours or discussion. Student will get the most out of lectures if he has worked through problems related to material to be covered before lecture.

Discussions

Chances are others are experiencing similar difficulties and student will be able to learn from his questions too. It is essential that student have worked on his own to solve his problems, because then he will be most able to understand their solution.

Grading

Course major exam will be graded on a 100-point scale. No makeup exams will be given. The major exams count for 40% of the course grade. Course quizzes and attendance count for 5% of the course grade. Quizzes will be given in the recitation classes, the problems in quizzes can be related to any material mentioned in the syllabus.

The lab score counts for 25% of the course grade. The various components of the lab will be graded as follows: The lab experiment reports (30 points for each lab period), lab quizzes (10 points each), and the lab exam (60 points). Lab quizzes are given at the beginning of each lab to check your familiarity with the basic features of the lab to be done. A missed lab counts as zero.

**Course grade**

The course grade will be determined as follows:

Contributions to overall course score	
Major exams	40%
Final exam	30%
Discussion and quizzes	5%
Laboratory	25%

HBCC Rules for Students

Attendance: you are expected to attend all classes. If you are temporarily absent, you alone are responsible for making up all missed course theory and exercises.

Absenteeism: a record of absences is consistently compiled and updated. If the student absences exceed 20% without excuse, he will be denied from the Course, i.e. get DN.

Behavior: any student who disrupts the learning environment may be subjected to disciplinary action under the KFUPM code.

Exam cheating: failure to obey KFUPM exam regulations can result in official disciplinary action.



WEEKLY SCHEDULE

Wk	Topic/Subject	Lec.	Ch.	Sec.	Homework	Laboratory
1	Chemical Foundations	1	1	1-5	34, 44,50,56, 71	No Lab
		2	1	6-9		
	Atoms, Molecules, and Ions	3	2	1-3	27, 47, 49, 59,68	
		4	2	4-6		
2	Atoms, Molecules, and Ions	5	2	7-8		The Laboratory and SI (Dry lab)
	Stoichiometry	6	3	1-3	27,53,58, 62, 69, 75,86,89,101	
		7	3	4-6		
3	Stoichiometry	8	3	7-8		Basic laboratory Operation (Expt. 1)
		9	3	9-10		
	Types of Chemical Reactions and Solution Stoichiometry	10	4	1-3	17,22,31,37,47,55,63, 67, 71,73	
4	Types of Chemical Reactions and Solution Stoichiometry	11	4	4-6		Water analysis (Expt. 3)
		12	4	7-8		
		13	4	9-10		
5	Gases	14	5	1-2	27,34,38,53,63,67,70, 77, 86,89,	Percent of water in a hydrated salt(Expt. 6)
		15	5	3-4		
		16	5	5-6		
6	Gases	17	5	6-7		Limiting reactant (Expt. 8)
		18	<i>Review</i>			
		19	5	7-8		
7	Thermochemistry	20	6	1-2	22,30,36,42,45,61,64,73	A volumetric analysis (Expt. 9)
		21	6	2-3		
		22	6	3-4		
8	Atomic Structure and Periodicity	23	7	1-3	40,42,49,59,64,66,7,80,90, 96	Vinegar analysis (Expt. 10)
		24	7	4-5		
		25	7	6-9		
9	Atomic Structure and Periodicity	26	7	10-11		Molar mass of a volatile compound (Expt. 18)
		27	7	11-12		
	Bonding - General Concepts	28	8	1-3	23,25,34,39,43,46,54,57,68,81,93	
10	Bonding - General Concepts	29	8	4-6		Calorimetry (Expt. 21)
		30	8	7-9		
		31	8	10-11		
11	Bonding - General Concepts	32	<i>Review</i>			Synthesis of an alum (Expt. 17)
		33	8	12-13		
	Covalent Bonding - Orbitals	34	9	1	27,32,36,40,45,51	
12	Covalent Bonding - Orbitals	35	9	2-3		Molar mass of a solid (Expt. 20)
		36	9	4-5		
	Liquids and Solids	37	10	1-2	29,33,44,45,53,63,71,82, 87, 91	
13	Liquids and Solids	38	10	3-4		Lab test
		39	10	6-8		
		40	10	8-9		
14	Properties of Solutions	41	11	1-2	26,31,38,43,49,53,58,66,70,71	No Lab
		42	11	3-4		
		43	11	4-5		
15	Properties of Solutions	44	11	6-7		No lab
		45	<i>Review</i>			

Note: Sections 5.9, 5.10, 6.5, 6.6, 7.13, 10.5, and 11.8 are reading assignments and will not be covered in the lecture.