



KAU
KING ABDULAZIZ UNIVERSITY
ACADEMIC ASSESSMENT UNIT

COURSE PORTFOLIO



FACULTY OF SCIENCE

DEPARTMENT OF CHEMISTRY

GENERAL PHYSICAL CHEMISTRY

CHEM 202

PART II



COURSE SYLLABUS

Instructor Information

- ✍ Name of the instructor: - Prof. Dr. Sulaiman Nasir Basahel
- ✍ Office location: - Building # 115, Third floor 347
- ✍ Office hours: - Sat. 9-11 Mon. 9-11 & Wed 9-1
- ✍ Contact number(s): 02-6400000 Ex. 52308
- ✍ E-mail address:- sbasahel@hotmail.com/ sbasahel@kau.edu.sa
- ✍ Website:- www.kau.edu.sa/sbasahel

Course Information

- ✍ Course name and number: - General Physical Chemistry. **CHEM 202**
- ✍ Course meeting times, places:- S_B – Sat. Mon. & Wed. 8 – 9 am, Dept.
- ✍ Course prerequisites and requirements: - Successful completion of Chemistry 110, Chem. 281.
- ✍ Description of the course: - This course deals with study of the general principles of physical chemistry, including thermo chemistry, spontaneity of reaction, thermodynamics, physical properties of solution, kinetics, and nuclear reactions, electrochemistry.

Teaching methodology:

- 1) The fundamental method of transmitting material to the students is by means of traditional lectures.
- 2) Power point presentations, white board, active learning via group discussions, & solving problems.
- 3) Web resources will be used where appropriate.

Policies and Procedures:

- 1) All cell phones, beepers, and pagers must be turned off during lecture.
- 2) Students are expected to arrive for class on-time so as not to disrupt a lecture in progress.
- 3) All homework assignments will have a due date on them: Typically a student will have two weeks in which to complete an assignment. Late homework assignments will not be accepted.

Course Objectives

This course is designed to learn basic concepts of physical chemistry.

- a) Selected topics in thermochemistry; includes exothermic & endothermic reactions, bond energy, Enthalpy, Hess law, Calorimetry
- b) Selected topics in thermodynamics; includes first law, second law & Third law of thermodynamics, Entropy, Free Energy.

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- c) Selected topics in Physical properties of solutions; includes concentration units, solute, solvent, Henry's & Raolt's laws, colligative properties.
- d) Introductory Chemical Kinetics will be investigated. To learn basic aspects of both experimental and theoretical chemical kinetics and how this information is applied to problems of chemical interest.
- e) Introductory Nuclear Chemistry. Radioactivity, radioactive decay, binding energy half life time, fission & fusion nuclear reaction.
- f) Basics in Electrochemistry. Learn basic aspects of both experimental and theoretical electrochemistry, and how this information is applied to problems of chemical interest. Students will have reviewed and deepened there understanding of galvanic and electrolytic cells.

Expectations and Outcomes

Students who successfully complete this course should have a good background for pursuing other courses in chemistry and other sciences that require knowledge of the material addressed in Physical Chemistry II. One of the keys to success in a Physical Chemistry Course is to do lots of problems. In additional to Physical Chemistry textbooks, a problem solving books exist.

Outcome a They will learn the basic concepts associated with thermochemistry.

Outcome a.1: *Students will review and understand exothermic and endothermic reactions.*

Outcome a.2: *Students will learn the concept of internal energy and enthalpy. They will review Hess's law and calorimetry.*

Outcome b Student should learn key concepts associated with introductory Thermodynamics

Outcome b.1: *Students will understand the first law of thermodynamics, Entropy and second law of thermodynamics.*

Outcome b.2: *Students will learn the Gibbs free energy and how to correlate the different thermodynamic functions in a law.*

Outcome b.3: *Students will learn the spontaneity of the reaction and how do a chemist exploring a chemical process.*

Outcome c They will learn the basic concepts associated with ideal and real solutions.

Outcome c.1: *Students will learn the phase rule and study colligative properties.*

Outcome c.2: *Students will review and understand Raoult's and Henry's Law.*

Outcome d Students should learn basic aspects of both experimental and theoretical chemical kinetics and how this information is applied to problems of chemical interest.

Outcome d.1: *Students will have reviewed and deepened there understanding of differential rate laws, integrated rate laws, temperature dependence of reaction rates, and reaction mechanisms.*

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Outcome d.2: *Students should understand the basic concepts of catalysis.*

Outcome e They will learn the fundamentals of radioactivity as an introduction to the nuclear chemistry course.

Outcome e.1: *Students will have reviewed and deepened their understanding of radioactivity and binding energy, half life time.*

Outcome e.2: *They will have reviewed and deepened their understanding nuclear reactions, fission and fusion reactions.*

Outcome f To learn basic aspects of both experimental and theoretical electrochemistry, and how this information is applied to problems of chemical interest.

Outcome f.1: *Students will have reviewed and deepened their understanding of galvanic and electrolytic cells.*

Learning Resources

✍ Text books:-

1. Chemistry by Chang, 9th Edition 2008
 2. Chemical Principles by Mortimer 6th Edition 2003.
 3. Lab. Note can be get from the teaching assistant in the lab.
- A calculator is needed for home work, lab report, exams,

✍ The lab will be in 3rd floor at building # 115 (lab for chem. 202).

✍ The lab schedule is according to your section in the transcript.

Course Requirements and Grading

✍ **Course Grading:**

Three exams (5 marks each)	15 marks
Midterm exam	15 marks
Class activities	5 marks
Labs	25 marks
Final exam	40 marks
Total	100 marks

✍ **Labs Grading:**

First exams	4 marks
Second exams	5 marks
Class attendance & activities	10 marks
Practical exams	6 marks
Total	25 marks

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Letter grades are assigned based on a range of:

++ = 100%,

A⁺ = 99-95%,

A = 94-90%,

B⁺ = 89-85%,

B = 84-80%,

C⁺ = 79-75%,

C = 74-70%,

D⁺ = 69-65%,

D = 64-60%.

F = Below 60 marks.

- ✍ If you miss an exam for a very good and justifiable reason (such as a doctor's note), a new exam will be written for you that it is guaranteed to be harder than the original exam.

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Detailed Course Schedule

Course Schedule Model (meeting three times a week)

Week #	Lecture	Topic	Reading Assignment	What is Due?
1	Lec.1	Syllabus + Reference + Quiz times + Office hours		Buy Book
	Lec.2	Energy, Thermochemistry, Temperature and Heat	Chapter 6	Reading Chapter 6
	Lec.3	Thermochemical Equations, The enthalpy		Homework assignment #1
2	Lec.4	Hess's Law, Enthalpies of Formation		Reading Chapter 6
	Lec.5	Introduction to thermodynamics	Chapter 6	Homework assignment #2
	Lec.6	Calorimetry		
3	Lec.7	Introduction to thermodynamics		Reading Chapter 18
	Lec.8	Entropy	Chapter 18	
	Lec.9	Standard entropy and the second law of thermodynamics		
4	Lec.10	The third law of thermodynamics, Gibbs Free Energy		Reading Chapter 18
	Lec.11	Standard free energy changes, Free energy and chemical equilibrium		
	Lec.12	Applications of Equations		Homework assignment #3
5	Lec.13	First Exam	Ch. 6 and 18	(5 marks)
	Lec.14	Types of solutions and concentration units	Chapter 12	Reading Chapter 12
	Lec.15	The effect of temperature on solubility		
6	Lec.16	The effect of pressure on solubility		
	Lec.17	Colligative properties of nonelectrolyte solutions		
	Lec.18	Colligative properties of electrolyte solutions		Homework assignment #4
7	Lec.19	The rate of a reaction		Reading chapter 13
	Lec.20	The rate law	Chapter 13	

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Week #	Lecture	Topic	Reading Assignment	What is Due?
	Lec.21	The relation between reactant concentration and time		
8	Lec.22	Activation energy and temperature		
	Lec.23	Reaction mechanisms		
	Lec.24	Catalysis		Homework assignment #5
9	Lec.25	Second Exam	Ch. 12 and 13	(5 Marks)
	Lec.26	The nature of nuclear reactions	Chapter 23	Reading Chapter 23
	Lec.27	Nuclear stability		
10	Lec.28	Natural radioactivity		
	Lec.29	Nuclear transmutation		
	Lec.30	Nuclear fission and nuclear fusion		Homework assignment #6
11	Lec.31	Third Exam	Ch. 13 and 23	
	Lec.32	Redox reactions	Chapter 19	Reading chapter 19
	Lec.33	Galvanic cells		
12	Lec.34	Standard reduction potentials		
	Lec.35	Spontaneity of redox reactions		
	Lec.36	The Effect of concentration on cell e.m.f.		Homework assignment #7
13	Lec.37	Solutions of Problems		
	Lec.38	Revision	Chapter 19	
	Lec.39	Fourth Exam	Chapter 19	Fourth Exam
14	Lec.40	Revision	Chapters 6&18	
	Lec.41	Revision	Chapter 12	
	Lec.42	Revision	Chapter 13	
15	Lec.43	Revision	Chapter 23	
	Lec.44	Solutions of Problems		

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Week #	Lecture	Topic	Reading Assignment	What is Due?
		Final Exam all Sections		

HOMWORK ASSIGNMENT

From the book (Chemistry by Chang 9th Edition)

1. Homework assignment # 1 (Chapter 6)
16, 26, 28, 38.
2. Homework assignment # 2 (Chapter 6)
54, 62, 82, 92.
3. Homework assignment # 3 (Chapter 18)
12, 18, 24, 44, 52, 60, 70
4. Homework assignment # 4 (Chapter 12)
16, 18, 24, 52, 66, 78, 82
5. Homework assignment # 5 (Chapter 13)
18, 20, 28, 38, 40, 54, 72, 102, 110
6. Homework assignment # 6 (Chapter 23)
6, 14, 56, 66.
7. Homework assignment # 7 (Chapter 19)
2, 12, 16, 18, 22, 32, 46, 52, 58.

Practical Sessions Schedule Model
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Lab. #	Date	Exp/Practical title	Reading Assignment	What is Due?
1	Weak 1	Safety & Regulations		Lab Report #1
2	Weak 2	Determination of the Heat Capacity of Calorimeter		Lab Report #2
3	Weak 3	Determination of the Heat of Neutralization of a Strong Acid with a Strong Base		Lab Report #3
4	Weak 4	Determination of Distribution Coefficient of Iodine Between Immiscible Solvents		Lab Report #4
5	Weak 5	Determination of Equilibrium Constant Using Distribution Coefficient of Iodine Between Immiscible Solvents		Lab Report #5
6	Weak 6	Determination of the Critical Solution Temperature of Phenol-Water System		Lab Report #6
7	Weak 7	Preparation & Properties of Buffer Solution		Lab Report #7
8	Weak 8	Midterm Exam		Midterm Exam
9	Weak 9	Determination of Molal Freezing Point Depression Constant		Lab Report #8
10	Weak 10	Determination of the Dissociation Constant of Weak Electrolyte by Measuring the Conductance		Lab Report #9
11	Weak 11	Conductometric Titration & Determination the Normality of Unknown		Lab Report #10
13	Weak 12	Final Exam		

PART III



COURSE RELATED MATERIAL

Contains all the materials considered essential to teaching the course, includes:

Quizzes, lab quizzes, mid-terms, and final exams and their solution set

Paper or transparency copies of lecture notes/ handouts (optional)

Practical Session Manual (if one exists)

Handouts for project/term paper assignments

PART IV



EXAMPLES OF STUDENT LEARNING

Examples of student work. (Included good, average, and poor examples)

Graded work, *i.e.* exams, homework, quizzes

Students' lab books or other workbooks

Students' papers, essays, and other creative work

Final grade roster and grade distribution

Examples of instructor's written feedback of student's work, (optional)

Scores on standardized or other tests, before and after instruction, (optional)

Course evaluation, self evaluation or students comments (optional)

PART V



INSTRUCTOR REFLECTION (optional)

Part V. Instructor Reflections on the Course

- ✍ General physical chemistry course is one of the most important courses in chemistry because it provides the student with the fundamentals of the most important parts of physical chemistry. Therefore it is considered as important & long course and need hard work.
- ✍ Questions, discussions in the class, & the result of the exam indicated that the course is well understood.
- ✍ The contents of the course (about six chapters) are enough to give the student the basic knowledge about physical chemistry courses.
- ✍ Physical Chemistry and the Web:
Throughout this course, URL's will be given to interesting P. Chem. Sites.

COURSE PORTFOLIO CHECKLIST

TITLE PAGE

COURSE SYLLABUS

COURSE RELATED MATERIAL

EXAMPLES OF EXTENT OF STUDENT LEARNING

INSTRUCTOR REFLECTION ON THE COURSE

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