

## Course Specifications of General Chemistry ( Physical, Inorganic & Organic)

**University:** Assalam International University  
**Faculty:** Pharmacy

### ***Course Specifications***

Program(s) on which the course is given: B. Sc. in Pharmacy.

Faculty offering the program: Faculty of Pharmacy.

Department offering the course: Pharmaceutical Chemistry.

Academic year / level: 2007/2008 pre Pharmacy students.

### ***A-Basic Information***

Title : **Physical, Inorganic and Organic Chemistry.**

Code :

Credit hours :

Lecture : 4 H / week for one semester.

Tutorial : 2 H each 3 weeks.

Practical : 2½ H / week for one semester.

Total : 50 H (Lectures), 10 H (tutorial) and 32½ H (Practical)..

### ***B-Professional Information***

#### **1- Overall Aims of Course**

The course is divided into 3 main parts:

- i- Physical Chemistry.
- ii- Inorganic Chemistry.
- iii- Organic Chemistry.

The course of physical chemistry is designed to give the basic concepts of some topics such as: the rate of the reaction, kinetics of chemical reactions, thermo-chemistry and thermodynamics of chemical reactions and solution chemistry, chemical kinetics in addition to photochemistry.

The course of inorganic chemistry is mainly designed to introduce the student to the basic principle of qualitative inorganic reactions. The identification and analysis of anions and cations and their mixtures is the main goal.

The course of organic chemistry is mainly designed as introduction to the basic principle needed for understanding many branches (will be studied later) such as pharmaceutical, phyto- and bio- chemistry, molecular biology, drug design, chemistry of drugs in addition to pharmacology and metabolism.

## 2- Intended Learning Outcomes of Course (ILOS)

After completing the course, the students will be able to appreciate and demonstrate the following:

### a- Knowledge and Understanding how to:

- 1- Define the order of a chemical reaction.
- 2- Calculate the expiration date for a chemical substance.
- 3- Calculate the half-life time ( $t_{1/2}$ ) of a chemical substance.
- 4- Define and understand the photochemical reactions of chemical
- 5- substances.
- 6- Identify and analyse inorganic anions.
- 7- Identify and analyse the different cations.
- 8- Analyse mixture of inorganic constituents, identify and confirm the presence of each component.
- 9- The student will comprehend the various structural representation of compounds, and recognize the different functionalities.
- 10- Demonstrate a basic knowledge of the properties of organic molecules; and understand how their chemical and physical properties

### b- Intellectual Skills:

- 1- Given the basic data of a chemical reaction, the student will be
- 2- able to define the order of the reaction, its half-life time and rate of the reaction.
- 3- Given the basic data on the blood-level concentration of a drug and rate of chemical reaction, the student will be able to calculate and predict the expiration date of the drug.
- 4- Given a sample containing inorganic or organic constituent, the student can identify the different anions and cations and confirm the presence of each analyte..
- 5- Given the basic data on a thermochemical reaction, the student can
- 6- calculate the heat of the reaction, neutralization, combustion...etc of a chemical reaction.

### c- Professional and practical skills:

- 1- To be able to describe an analytical scheme for the analysis of inorganic mixture of anions, cations and organic compounds.
- 2- Use the basic chemistry laboratory safely and effectively.
- 3- Write a report on the analysis of a chemical substance.

### d- General Transferable Skills:

- 1- How to write a scientific report.
- 2- How to give an oral representation.

- 3- How to find effective solutions for problems involving reasonably complex interference in mixing chemical compounds.
- 4- Study independently to meet target in their dead time.

### 3- Contents:

#### A- Lectures

Topic	Number of hours
<p><b><u>I-Inorganic Chemistry</u></b></p> <p><b><i>1) Introduction to inorganic chemistry:</i></b></p> <p>1.1- Moles, <i>Avogadro's N<sup>o</sup></i> &amp; Chemical equations</p> <p>1.2- Types of chemical reaction.</p> <p>1.3- Chemical Equilibrium.</p> <p>1.4- <i>Le-Chatlier</i> Principle.</p> <p>1.5- Law of mass action.</p> <p>1.6- Common-ion effect.</p> <p>1.7- Complex formation.</p> <p>1.8- Solubility Product Principle.</p> <p>1.9- Redox reaction.</p> <p><b><i>2) Analysis of Anions:</i></b></p> <p>2.1-Introduction and classification of anions.</p> <p>2.2-Carbonate group.</p> <p>2.3-Halides group.</p> <p>2.4-Sulphur group.</p> <p>2.5-Nitrogen group.</p> <p>2.6-Cyanogen group.</p> <p>2.7-Phosphorus and Arsenic group.</p> <p>2.8-Analysis of mixture of anions.</p> <p><b><i>3) Analysis of Cations:</i></b></p> <p>3.1-Introduction and classification of cations.</p> <p>3.2-Methods of analysis.</p> <p>3.3-Identification of single cation and mixture of Cations.</p> <p>3.4-Analysis of the group precipitate.</p> <p><b><u>II- Physical Chemistry:</u></b></p> <p>1- Thermochemistry and thermodynamics.</p> <p>2- Electrolysis &amp; electrical conductance.</p> <p>3- Chemical kinetics.</p> <p>4- Photochemistry</p> <p><b><u>III- Organic Chemistry:</u></b></p> <p><b><u>A review of atoms and molecules:</u></b></p>	

<p>Structure of atom, quantum mechanical model of an atom, electronic configuration, shapes of atomic orbitals, variation of atomic properties with electronic structure.</p> <p><b><u>Introduction to the chemical bond:</u></b> Chemical bonds (ionic, covalent and coordinate), valence and hybridization, electronegativity and the polarity of covalent bonds.</p> <p><b><u>Representation of organic compounds :</u></b> Two-dimensional representations and three dimensional representations.</p> <p><b><u>Polarization of bonds and molecules and intermolecular forces :</u></b> Inductive effect, hyperconjugation, mesomeric effect, dipole moment, hydrogen bonding and other dipole bonding, in addition to their effect on the behavior of organic compounds.</p> <p><b><u>Concepts of acidity and basicity :</u></b> Different definitions and relative strengths of acids and bases.</p> <p><b><u>Organic reactions :</u></b> Reactivity of covalent bonds, breaking of covalent bonds (heterolysis and homolysis), organic species: carbocations, carbanions, free radicals and carbenes.</p>	
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## **B- Practical**

<b>Topic</b>	<b>Number of hours</b>
One Semester	<b>32.5</b>

### **4- Teaching and Learning Methods:**

- 4.1- Lectures using whiteboard and blackboard.
- 4.2- Lectures using over-head projector, Power point, laptop (tablet), in addition to models.
- 4.3- Laboratory equipments.

### **5- Student Assessment Methods**

- 5.1- Quizzes to assess Knowledge and understanding.
- 5.2- Written exam to assess general skills.
- 5.3- Lab. Reports to assess practical skills.

5.4- Oral exam to assess confidence and understanding.

#### Assessment Schedule

Assessment	Week
Quizzes:	One every 3 weeks
Practical 1 exam	Six week after beginning
Practical 2 exam	Last week of first term
Written exam	Last week of first term

#### Weighing of Assessment

Quizzes

Written Examination

Practical Examination

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Total

100 %

#### 6- List of References:

- 1- Course Notes: Lectures notes written by Faculty Members.
- 2- A.P.Kreshkov, A.A.Yaroslavdsev, Mir Publisher, Moscow.
- 3- Qualitative Analysis, 4<sup>th</sup> ed., W.C.Pierce, D.T.Sawyar, E.L.Haenish, Wiley and Sons, New York.
- 4- Physical Chemistry, Ya.Gerasimov, Mir Publisher, Moscow  
Semimicroqualitative Analysis, C.H.Sorum, Prantice Hall, Jersey New.
- 5- Text book of Organic Chemistry:  
Solomon's, Brown, Wade, Carey's, Mc-Murry, Murphy &  
*Schum's* Problem Solver.

#### 7- Facilities Required for Teaching and Learning

1. Large smart lecture room.
2. Data Show and Laptop Computers.
3. Laboratories with enough chemicals and apparatus.
4. Software.
5. Text book.
6. Models.
7. Simulation programs.

**Course Coordinator:**

**Head of Department:**

Date: 25 /01 /2021