Course Outline

Course Title: Chemistry Special Topics

Course Code: **CHEM-291**

Course Duration: 1 semester

Credit Units: (3+1) 4 credit

Teacher:

Dr Muhammad Azhar Abbas Raja

Department of Chemistry (Jinnah Block)

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Introduction to course

- ➢ Introduction to Spectroscopy
- ➢ Simple Heterocycles
- ➢ Bio-molecules
- ➢ Surface Phenomena and Colloids
- ➢ Modern Materials
- ➢ Nuclear Chemistry
- ➢ Chemical Industries

Course pre-requisites

- ➢ The prerequisites is the Physical Chemistry (CHEM 181), Inorganic Chemistry (CHEM 161) and Organic Chemistry (CHEM 271) in minimum grade "C" or better and promoted in IV semester in BS program by meeting the minimum criteria of Department of Chemistry.

Learning outcomes

- ➢ Student will be able to learn the basic knowledge of biomolecules and simple heterocycles. Introductory organic spectroscopy is helpful in identification of organic compounds. Basics of surface chemistry, colloids, nuclear chemistry and modern material chemistry like ceramics, fiber glass etc. will be useful for learners to know the nature and mechanism of phenomenon. In addition to it, a detail study of unit operations in chemical industry and metallurgy can be a beneficial study for new learners who are ambitious for study of applied chemistry.
- ➢ Compare and relate the selected topics with the ones in General Chemistry and generate the conceptual links between the two fields, in order to establish a broader perspective on these foundational topics.

Textbooks to be used for the course

- Voet, D. R and Voet, J. G. Biochemistry, John Wiley & Sons, NY (2001).
- Kent, J.A. Riegal"s Handbook of Industrial Chemistry, CBS Publishers and Distributors, New Delhi, (1997).
- Arnikar, H.J. Nuclear Chemistry. Krishna Prakashan Media (P) Ltd. (1998).
- Gurdeep R. "Advanced Physical Chemistry", Krishna Prakashan Media (P) Ltd. Delhi.(2002).
- Younas, M., Organic Spectroscopy, A. H. Publisher, Lahore (2005)
- Some relevant material from internet sourses.

Description of system of evaluation (Exam, assignments etc)

- Sessional   15 (Min. attendance 75 % is necessary to appear in exam)
  (Attendance, Assignment & presentation)
- Mid Term Exam   15%
- Project/Practical/Oral work   25%
- Final Exam.   45%

Detailed lesson plans for each lecture (*Weekly/Week wise*)

WEEK	CONTENT
1-2	Introduction to Ultraviolet-Visible Spectroscopy, UV & wood ward Fieser rule for lamda max calculation
3-4	Introduction to IR (IR active and inactive group & factors affecting IR and how to take IR spectra in lab) synthetic applications. Exercise of lambda max calculation and Assignment Lab: Qualitative analysis of carbohydrates, protein and lipid.
5-6	Bio molecules (carbohydrates, lipids proteins and nucleic acids, their importance, nomenclature, synthesis and properties). Lab: Estimate of glucose in the sample by the titration method.
7-8	Heterocyclic compounds (Pyrrol, Furan, Thiophene and Pyridine, their properties, nomenclature, synthesis, importance and reactions). Lab: Estimate the glucose content by titration method & determination of adsorption parameters using langmuir adsorption isotherm of acetic acid on charcoal
9	*Mid-term* Exams
10-11	Surface phenomenon and colloids (physisorption, chemisorption, isotherm ,its types, properties, preparation and application)
12-13	Modern material (introduction to liquid crystal, inorganic polymers and ceramics, fiber glass, thin films, semi-conductors and composite materials)
14-15	Nuclear chemistry (radio activity, stability of nuclei, nuclear transformation, measurement of nuclear radiation, nuclear reactions, fission and fusion, nuclear reactor, uses of radio isotopes, nuclear hazard and safety measures)

16-17	Chemical industries (metallurgy of Aluminium, manufacturing of sulphuric acid, nitric acid, fertilizers, cement, glass)
18	*Final* Exam

Key dates and time of class meetings

Semester Start Date: *w.e.f* January 13, 2020.

Course	Mon	Tue	Wed	Thu
CHEM-291	01-02	01-02	02-03	
		03-05 Lab		