

**School of Chemistry
Faculty of Science
University of the Punjab, Lahore
Course Outline**



BS Chemistry Semester-III					
Programme	BS Chemistry	Course Code	Chem-261	Credit Hours	2
Course Title	Water Treatment and Cleansers		Course Type	Major Elective	
Course Introduction					
<p>This course content will help the students to understand the chemistry of water regarding its industrial use in particular. It will also help them to learn about the operations and processes involved in manufacturing of soaps and detergents.</p> <p>Water for Industry: Importance of Water in industry; Criteria of water quality for industrial use; Water hardness; softening of water by classical methods, Ion-exchange, Demineralization, Reverse osmosis and Distillation; Boiler Scaling, types, effects and mechanism; Removal of Boiler scales, Physical and Chemical methods.</p> <p>Soaps, Detergents And Disinfectants: Soaps – Introduction, types, raw materials, counter-current method for soap manufacturing, recovery glycerin from spent lye and sweet water, builders and Additives. Detergents – Introduction, theory and working of detergents, cationic, anionic and non-ionic and amphoteric detergents, synthesis of typical anionic detergents, fabric softener (introduction and mechanism of action), Environmental impact of detergents. Disinfectants – Introduction, types and applications.</p>					
Learning Outcomes					
<p>On the completion of the course:</p> <ol style="list-style-type: none"> 1. The students will become familiarized with the concepts of general chemistry 2. This will enable them to qualify for basic to moderate level jobs involving general knowledge of chemistry 3. The obtained knowledge shall also enable the students to enter into various entrepreneurial activities involving general introduction to chemistry 4. Students will be able to understand the concept of GLP and GMP 					
Course Content				Assignments/Readings	
Week 1	Importance of water in industry; criteria of water quality for industrial use.			Class Based learning/tests	
Week 2	Water Hardness			Class Based learning/tests	
Week 3	Water Hardness			Class Based learning/tests	
Week 4	Softening of water			Class Based learning/tests	

Week 5	Ion Exchanger, Demineralization	Class Based learning/tests
Week 6	Reverse Osmosis	Class Based learning/tests
Week 7	Distillation	Written Assignment
Week 8	Boiler Scale and Removal	Class Based learning/tests
Week 9	Midterm Assessment	Class Based learning/tests
Week 10	Soaps – Introduction, types, raw materials,	Class Based learning/tests
Week 11	Counter Current Method	Class Based learning/tests
Week 12	Glycerin Recovery	Class Based learning/tests
Week 13	Builder and Additives	Class Based learning/tests
Week 14	Detergents	Class Based learning/tests
Week 15	Spray Drying Process of Detergents Manufacturing	Quiz
Week 16	Disinfectants	Class Based learning/tests

Textbooks and Reading Material

1. Applied Chemistry, Haq Nawaz Bhatti and Muhammad Salman, 2017, Caravan Book Publisher, Pakistan.
2. Water Supply and Sewerage, T.J.McGhee, McGraw Hill Book Co. New York.(1991)
3. Hand Book of Industrial Chemicals, By SIRI Board of Consultants and Engineers,
4. Shereve's Chemical Process Industries, 5th Ed.1975 by G.T.Austin McGraw Hill Book Co. New York.
5. Industrial chemistry, B. K. Sharma Krishna Prakashan Media (P) Ltd., Ed-15 (2006)

Teaching Learning Strategies

1. Lectures
2. Group Discussion
3. Laboratory work
4. Seminar / Workshop

Assignments: Types and Number with Calendar

1. Written 7th week
2. Quiz 15th week

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3.	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

BS Chemistry Semester-III					
Programme	BS Chemistry	Course Code	Chem-262	Credit Hours	1
Course Title	Applied Chemistry Lab		Course Type	Major Elective	
Course Introduction					
<p>This course content will increase the working skills of students regarding water testing labs and cosmetic industries.</p> <p>Titrimetry: Estimation of water hardness by complexometry Estimation of TSS and TDS in water Determination of acidity, alkalinity, Free CO₂ in water Determine the %age purity of the Commercial sample of sodium chloride.</p> <p>Soap: Determination of Free Alkali in Soap Determination of Combined Alkali in Soap Determination of Volatile matter in Soap Extraction of Fatty acids from soap</p>					
Learning Outcomes					
<p>On the completion of the course:</p> <ol style="list-style-type: none"> 1. Students are expected to become familiarized with the concepts of general chemistry 2. This will enable them qualify for basic to moderate level jobs involving general knowledge of chemistry 3. The obtained knowledge shall also enable the students to enter into various entrepreneurial activities involving general introduction to chemistry 4. Students are able to understand the concept of GLP and GMP 					
Course Content				Assignments/Readings	
Week 1	Estimation of water hardness by complexometry			Lab work / Notebook	
Week 2	Estimation of water hardness by complexometry			Lab work / Notebook	
Week 3	Estimation of water hardness by complexometry			Lab work / Notebook	
Week 4	Estimation of TSS and TDS in water			Lab work / Notebook	
Week 5	Determination of acidity in water			Lab work / Notebook	
Week 6	Determination of alkalinity in water			Lab work / Notebook	

Week 7	Determination of Free CO ₂ in water	Written Assignment
Week 8	Determine the %age purity of a commercial sample of sodium chloride.	Lab work / Notebook
Week 9	Mid Term Examination	Lab work / Notebook
Week 10	Determination of Free Alkali in soap	Lab work / Notebook
Week 11	Determination of Free Alkali in soap	Lab work / Notebook
Week 12	Determination of Combined Alkali in soap	Lab work / Notebook
Week 13	Determination of Combined Alkali in soap	Lab work / Notebook
Week 14	Determination of Volatile matter in soap	Lab work / Notebook
Week 15	Extraction of Fatty Acids from soap	Quiz
Week 16	Review and Viva Voce	Lab work / Notebook

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