

Chemistry I

Part A : Introduction

Course Code: CHE 109	Course Title: Chemistry I	
Course Type: Compulsory	Level/Term: Level 1, Term 1	Pre-requisite (s): NONE
Credit Value: 2.0	Contact Hours: 2 Hrs/Week	Total Marks: 100 (CIE :35, SMEE : 65)
<p>1. Course Summary: Chemistry course to cover selected topics to provide the students with the basic concepts of chemistry. It has been designed for the students who are enthusiastic to learning about the Chemical bonding, surface tension of a liquid; determination of surface tension of liquid by capillary tube method, liquid flow & viscosity; determination of co-efficient of viscosity of liquid by poisculle's method, stream line motion, turbulent motion, osmosis, determination of osmotic pressure, colloidal solution and their preparation, coagulation and adsorption; electrochemistry, photochemistry, petroleum, conversion processes in petroleum refining (cracking, reforming, polymerization, alkylation, hydrogenation, isomerization, and chlorination), pyrolysis of coal and coal tar fractionation, benzene substitution reactions in reference to various chemical classes of dye-stuff intermediates, mono, di- and polysaccharides, elements of structure of glucose, cellulose and starch with emphasis on the chemistry of cellulose and its degradation products , hydroxyl and carbonyl compounds.</p> <p>2. Course Objectives: The objective of the chemistry course is to acquaint the students with the basic phenomenon/concepts of chemistry, the student faces during course of their study in the textile industry and engineering field. The student with the knowledge of the basic chemistry will understand and explain scientifically the various chemistry related problems in the textile industry/engineering field.</p> <p>3. Course Learning Outcomes (CLO)/(CO): at the end of the course, the students will be able to-</p>		
CLO 1	Acquire basic knowledge about chemical bonding, nature of molecules and their reactions.	
CLO 2	Learn about chemical bonding and their geometry.	
CLO 3	Know the basic properties of acid-base by using different theories and learn about pH, buffer solution, acid-base titration and what will be the effect of common ions.	
CLO 4	Impart knowledge of rate of a reaction, rate law, reaction order collision theory, reaction mechanism.	
CLO 5	Understand the relationship between chemical kinetics and chemical equilibrium.	
CLO 6	Understand the surface tension and viscosity of a liquid.	
CLO 7	Impart knowledge about the photochemistry, quantum yield, fluorescence and phosphorescence, luminescence and chemiluminescence.	
CLO 8	Learn the nomenclature, properties, reaction and application of aliphatic and aromatic hydrocarbon.	

4. Mapping/Alignment of CLOs/COs with Program Learning Outcomes(PLO/PO):												
	PLO (a)	PLO (b)	PLO (c)	PLO (d)	PLO (e)	PLO (f)	PLO (g)	PLO (h)	PLO (i)	PLO (j)	PLO (k)	PLO (l)
CLO 1	√	√	√	√	√		√	√	√		√	
CLO 2	√								√			
CLO 3	√	√	√			√	√	√	√		√	
CLO 4	√	√		√		√	√		√			
CLO 5	√	√			√				√			
CLO 6	√	√	√						√			
CLO 7	√	√		√	√				√			
CLO 8	√	√	√					√	√		√	

Part B- Content of the Course

5. Topics to be covered/Content of the course

Topics with Contents	Time Frame/ Session	Specific Outcome (<i>What students will achieve in terms of Knowledge, Skills and Abilities, KSA</i>)	Teaching Strategies & Suggested Activities (<i>in relation to each topic or lesson</i>)	Teaching Aids/Tools/ Materials (<i>Books, Online Resources, Multi Media, Pictures, Reports, Charts, Newspapers, handouts, etc.</i>)	Assessment Technique	Alignment with CLOs

<p>1. Chemical Bonding and Molecular Geometry: Ionic bonds, Covalent bonds, octet rule, exception to octet rule, bond polarity, resonance, hydrogen bonding, VSEPR theory, metallic bonding, Valence bond theory (VBT), Molecular orbital theory (MOT).</p>	<p>Week 1-3 (Session 1-6)</p>	<p>a) To know the basic knowledge of ionic and covalent bonding b) To explain the intermolecular bonding c) To understand the Molecular orbital & VSEPR theory.</p>	<p>Lecture, Group study, Forum Discussion, Practicing H5P interactive contents (Animated video with questions)</p>	<p>White Board, Multi-media Power point, Video, Images, Online Platform(BLC), Ice Breaking Tools, Books</p>	<p>Quiz, Question Answer, Presentation , Assignment</p>	<p>CLO 1 CLO 2</p>
<p>2. Acids and bases: (a) Arrhenius concept, Bronsted-Lowry concept, Lewis concept, acid-base strengths, self-ionization of water and pH. (b) Acid-base equilibria: solution of a weak acid or base, common ion effect, buffers, alkalinity, acidity, acid-base titration.</p>	<p>Week 4-5 (Session 7-10)</p>	<p>a) To know the basic properties of acid-base by using different theories b) To understand about pH, buffer solution, acid-base titration and what will be the effect of common ions.</p>	<p>Lecture, Group study, Discussion, Video presentation, assignment with the natural acids in foods</p>	<p>White Board, Multi-media Power point, Video, Images, Online Platform (BLC), H5P interactive contents</p>	<p>Quiz, Question Answer, Presentation , Assignment (Class Test 1)</p>	<p>CLO 1 CLO 3</p>
<p>3. Chemical kinetics: Rate of a reaction; Rate law; Reaction order; First-order, Second-order and Zero-order reactions; preliminary concepts of Collision theory, Arrhenius equation, Reaction mechanism; Molecularity of a reaction, Rate-determining step; Catalysis:</p>	<p>Week 6-7 (Session 11-14)</p>	<p>a) To know the Rate of a reaction; Rate law; Reaction order; First-order, Second-order and Zero-order reactions, b) To Collision theory, Arrhenius equation, Reaction mechanism; Molecularity of a</p>	<p>Lecture, Group study, Discussion, Video presentation</p>	<p>White Board, Multi-media Power point, Video, Images, Online Platform, Ice Breaking Tools</p>	<p>Quiz, Question Answer, Presentation , Assignment (Class Test 2)</p>	<p>CLO 1 CLO 4</p>

heterogeneous and homogeneous catalysis, enzyme catalysis.		reaction, catalysis and effect of enzymes				
4. Chemical Equilibrium: Equilibrium and equilibrium constant; Homogeneous and heterogeneous equilibria; Multiple equilibria; Relationship between chemical kinetics and chemical equilibrium; Reaction quotient; Factors that affect chemical equilibrium; Le Châtelier's principle; Changes in concentration, volume, pressure and temperature; Effect of catalyst.	Week 8-9 (Session 15-18)	a) To know the equilibrium constant; classification of equilibria; Relationship between chemical kinetics and chemical equilibrium. b) To explain Reaction quotient; Factors that affect chemical equilibrium c) To understand Le Châtelier's principle; and its effect on reaction	Lecture, Group study, Discussion, Video presentation, Assignment	White Board, Multi-media Power point, Video, Images, Online Platform, H5P interactive content	Quiz, Question Answer, Presentation, Assignment (Class Test 3)	CLO 1 CLO 5
Assignment		a) To evaluate the students assignment based on their assigned topic			Report	
Review on Mid Term and Preparatory Leave	Week 10 (Session 19-20)	a) To review the contents of mid-term examination, b) To solve questions of different years	Discussion about creative questions, Question Answer sessions	White Board, BLC		
Mid Term Examination	Week 11-12	-	-	-	-	-
5. Liquids and Solutions: (a) Surface tension: Surface tension of a liquid; Determination of surface tension of liquid by capillary tube	Week 13-14 (Session 21-24)	a) To understand Surface tension of a liquid; Determination of surface tension of liquid by capillary tube method,	Lecture, Group study, Discussion, Question-answer	White Board, Multi-media Power point, Video, Images, Online Platform, Ice	Quiz, Question Answer, Presentation, Assignment	CLO 1 CLO 6

method, molecular forces of cohesion and adhesion, molecular range, sphere of influence, surface tension and free energy of a surface (b) Viscosity: Liquid flow & viscosity; Determination of Co-efficient of viscosity of liquid by poisculle's method, Stream line motion, turbulent motion, velocity gradient, poiscuille's formula, osmosis and osmotic pressure, colloidal solution and their preparation.		molecular forces of cohesion and adhesion, molecular range, sphere of influence, surface tension and free energy of a surface. (b) To realize about Viscosity: Liquid flow & viscosity; Determination of Co-efficient of viscosity of liquid. (c) Students will be able to prepare colloidal solution.	session, Video presentation	Breaking Tools, practicing H5P content	(Class Test 4)	
6. Photochemistry: Laws of photochemistry, Quantum yield, Fluorescence and phosphorescence, luminescence and chemiluminescence.	Week 15-16 (Session 25-28)	a) To understand the chemical reactions. b) To know the Quantum yield, Fluorescence and phosphorescence, luminescence and chemiluminescence.	Lecture, Group study, Discussion, Video presentation	White Board, Multi-media Power point, Video, Images, Online Platform, Ice Breaking Tools, H5P contents	Quiz, Question Answer, Presentation, Assignment	CLO 1 CLO 7
7. Aliphatic and aromatic hydrocarbon: Hydrocarbon, benzene, Alcohols, phenols, aldehydes and ketones, Carboxylic acids, amines.	Week 17-18 (Session 29-32)	a) To understand the reactions of hydrocarbon, benzene, alcohol, phenols, aldehydes, ketones, Carboxylic acids and amines so that students would be skilled about reaction between fabric and dye.	Lecture, Group study, Discussion, Video presentation	White Board, Multi-media Power point, Video, Images, Online Platform, Ice Breaking Tools	Quiz, Question Answer, Presentation, Assignment	CLO 1 CLO 8

Presentation	Week 19 (Session 33-34)	a) To evaluate the students presentation based on their assigned topic	Question Answer	White Board, Multi-media Power point, Online Platform	Based on the rubrics of presentation	-
Review on Final Examination & Preparatory Leave	Week 20 (Session 35-36)	a) To review the contents of final examination, b) To solve questions of different years	Discussion, Question Answer	White Board, Multi-media Power point		-
Final Examination	Week 21-22	-	-	-	-	-

Part C- Assessment and Evaluation

6. Assessment Pattern

a) Class Tests

Four class tests will have been taken during the semester, among these two class tests will be taken before midterm exam and two will be after. Out of four tests best three tests marks will be counted. Makeup class tests will not be taken. Students are strongly recommended to participate in all class tests. Tests will be based on short question, fill in the blanks, MCQ, True/False, mathematical problems solving, and analytical types. Test scheduled will be in class time.

b) Assignment

The students can complete the assignment of this course individually. The assignment of this course based on allotted topic on chemistry related to textile processes and manufacturing. The topic will be allotted as assignment during the class which they have to prepare at home and will submit on or before the due date. No late submission of assignments will be accepted. The details of assignment is given below-

Sl. No.	Type of Assignment	Submission Date	Contents of Assignment
1.	Chemistry related to textile processes and manufacturing	After 15 days of allotted topics	Chapter 1: Introduction to the topic with objectives Chapter 2: Experimental Works/Data or Evidence Chapter 3: Results and Discussion Chapter 4: Conclusion References

c) Presentation

The students can complete the presentation of this course individually. The presentation of this course based on allotted topic on chemistry related to textile processes and manufacturing. The topic will be allotted during the class. Students will have to do the presentation on the given topic. The details of presentation is given below-

Sl. No.	Type of Presentation	Submission Date	Contents of Presentation	Type of method and Duration of Presentation
1.	Chemistry related to textile processes and manufacturing	Before 15 days of Final examination	Chapter 1: Introduction to the topic with objectives Chapter 2: Experimental Works/Data or Evidence Chapter 3: Results and Discussion Chapter 4: Conclusion	Type: Multi-media power point presentation Duration: 7 minutes

CIE- Continuous Internal Evaluation (35 Marks):

Bloom's Category Marks (out of 35)	Class Tests (15)	Assignments (5)	Presentation (08)	Class Attendance (07)
Remember	3		2	Students will be awarded for full marks if attend all classes
Understand	3	1	2	
Apply	3	1		
Analyze	2	1	2	
Evaluate	2	1	1	
Create	2	1	1	

SMEE- Semester Mid & End Examination (65 Marks):

Bloom's Category	Tests
Remember	10
Understand	10
Apply	10
Analyze	10
Evaluate	12.5
Create	12.5

7. Assessment and Evaluation

Grades will be calculated as per the university grading structure and individual student will be evaluated based on the following criteria with respective weights.

1. Class Tests-15%
2. Assignment-5%
3. Presentation-8%
4. Class Attendance-7%
5. Mid Term Examination-25%
6. Final Examination-40%

Total -100%

Part D-Learning Resources

8. Textbook

1. Physical Chemistry by Arun Bhal & G.D. Tuli
2. A Text Book of Organic chemistry by Arun Bhal & B.S Bhal
3. Advanced Inorganic Chemistry by R. D. Madan
4. Organic Chemistry by I. L. Finar
5. Principles of Physical Chemistry by M. M. Haque and M.A. Nawab
6. Industrial Chemistry by B. K. Sharma