

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



BS Chemistry Semester-IV					
Programme	BS Chemistry	Course Code	Chem-232	Credit Hours	2
Course Title	Stereochemistry		Course type	Major	
Course Introduction					
<p>The course is designed to provide an adequate knowledge about stereochemistry and its applications. The students will gain knowledge about the stereochemical behavior of organic molecules.</p> <p>Stereoisomers: Basic introduction, Different types of projections to represent stereoisomer, types of stereoisomer, conformational isomers, Rotation around a single bond and the concept of conformational analysis in ethane, propane, butane, pentane, cyclo-pentane, cyclo-hexane, mono & di substituted cyclohexane and cis/trans decalin system. Optical isomers: Optical activity, Optical isomerism up to three chiral carbon atoms, enantiomers and diastereomers, racemates, racemization and resolution of racemates, epimerization, stereoisomerism of cyclic diphenyls. enantiotopic and diastereotopic protons, prochirality, R/S and D/L system of nomenclature for optical isomers with more than one asymmetric carbon. Geometrical isomers: Cis/Trans nomenclature, Z and E conventions, determination of configuration, geometrical isomerism in open chain and cyclic compounds.</p>					
Learning Outcomes					
<p>On the completion of the course, the students will:</p> <ol style="list-style-type: none"> 1. Understand the key concepts of stereochemistry 2. Familiarize with conformational, configurational and geometrical isomers, their projections and nomenclature. 3. It will help in familiarization with concept of conformational, configurational and geometrical isomers, their projections and nomenclature. 					
Course Content				Assignments/Readings	
Week 1	Stereochemistry			Literature survey	
	Stereoisomers				
Week 2	Basic introduction			Draw flow sheet of classification	
	Different types of projections to represent stereoisomer				
Week 3	Types of stereoisomers			Practice problems	
	Conformational isomers				
Week 4	Rotation around a single bond				
	The concept of conformational analysis in ethane.				
Week 4	The concept of conformational analysis in propane and butane.				
	The concept of conformational analysis in pentane and cyclopentane.				

Week 5	The concept of conformational analysis in cyclohexane .	
	The concept of conformational analysis in mono and di-substituted cyclohexane.	
Week 6	The concept of conformational analysis in cis/trans decalin system.	
	Optical isomers Optical activity	Literature survey
Week 7	Optical isomerism up to three chiral carbon atoms	
	Enantiomers and diastereomers	
Week 8	Mid-Term Week	
Week 9	Racemates, racemization and resolution of racemates	
	Epimerization	
	Stereoisomerism of cyclic diphenyls	
Week 10	Enantiotopic and diastereotopic protons	
	Prochirality	
Week 11	R/S system of nomenclature for optical isomers with more than one asymmetric carbon.	Practice problems
	D/L system of nomenclature for optical isomers with more than one asymmetric carbon.	Practice problems
Week 12	Geometrical isomers Cis/Trans nomenclature	Practice problems
	Cis/Trans nomenclature	Practice problems
Week 13	Z and E conventions	
	Z and E conventions	
Week 14	Determination of configuration	
	Geometrical isomerism in open chain compounds.	
Week 15	Geometrical isomerism in cyclic compounds.	Literature survey
	Geometrical isomerism in open cyclic compounds.	
Week 16	Final-Term Week	
Textbooks and Reading Material		
<ol style="list-style-type: none"> 1. L.G. Wade, Organic Chemistry, 8th Ed., Pearson, 2012. 2. T.W. Graham solomons and Graig B. Fryhle, Organic chemistry, 10th Ed., John wiley and sons, 2011. 3. J.G. Smith, Organic chemistry, 3rd Ed, McGraw Hill companies, 2012. 4. C.K. Ingold, "Structure and mechanism in organic chemsitry", C.B.S. 5. Morison and Boyd, "Organic Chemistry", 6th Edition, Prentice Hall. 6. Brown and Foote, Organic chemistry, 6th., Pearsons Publishers 2011. 		

Teaching Learning Strategies

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

Assignments: Types and Number with Calendar

Practice questions from the exercises from the recommended textbook.
Literature review based assignment relevant to the course will also be given during the course

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.

Semester-IV					
Programme	BS Chemistry	Course Code	Chem-233	Credit Hours	1
Course Title	Organic Chemistry Lab		Course Type	Major	
Course Introduction					
<p>This course helps students to gain experimental skills for different organic transformations, separation and identification of two components in a mixture of unknown compounds via systematic physical and chemical tests.</p> <p>Organic Preparations Synthesis of aromatic nitro, halogens, amines, carboxylic acid, aldehyde and related compounds. (Depending upon the availability of chemicals and reagents) Organic syntheses may include different oxidation and reduction reactions.</p> <p>Quantitative and Qualitative Analysis Physical/ Chemical separation of mixture containing two Compounds, identification, confirmation and derivatization.</p>					
Learning Outcomes					
<p>On the completion of the course, the students will:</p> <ol style="list-style-type: none"> 1. Understand the key concepts of organic synthesis 2. Familiarize with organic preparations and quantitative analysis 					
Course Content				Assignments/Readings	
Week 1	Organic Preparations: Preparation of 2,4,6-nitrophenol from phenol			Literature survey	
Week 2	Preparation iodoform using ethanol			Search out problems synthesis and their solution.	
Week 3	Preparation 2,4-dihydroxy acetophenone				
Week 4	Preparation of azalactone				
Week 5	Preparation of glucosazone				
Week 6	Synthesis of phthalimide				
Week 7	Preparation of tetrahydro carbazole			Literature survey	
Week 8	Mid Term Examinations				
Week 9	Mixture Analysis Separation of given mixture of benzoic acid resorcinol			Write name and chemistry of reactions involved	
Week 10	Separation of given mixture of benzoic acid resorcinol			Search out problems in mixture analysis and their solution.	
Week 11	Separation of given mixture of benzamide and cinnamic acid			Write name and chemistry of reactions involved	
Week 12	Separation of given mixture of urea and alph-naphthol				

	Separation of given mixture of diphenylamine and benzophenone	
Week 13	Separation of given mixture of glucose and beta-naphthol	
Week 14	Separation of given mixture of thiourea and salicylic acid	
Week 15	Separation of given mixture of naphthalene and glycine	Write name and chemistry of reactions involved
Week 16	Final Term Examinations	
Textbooks and Reading Material		
<ol style="list-style-type: none"> 1. Vogel's Textbook of Practical Organic Chemistry (5th Ed.) by A.I. Vogel et al. Longman, UK, 1989. 2. Advanced Practical Organic Chemistry, by J. Leonard, B. Lygo, G. Procter, CRC. 1994. 3. Advanced Practical Organic Chemistry (2nd Ed.) by N.K. Vishnoi, Vikas Publishing House Pvt. Ltd. India, 1996. 4. K.N. Williamson and K.M. Masters, <i>Macroscale and Microscale Organic Experiments</i>, published by Cengage learning, 2011. 5. J.J. Li, C. Limberakis and D.A. Pflum, <i>Modern Organic Synthesis in Laboratory</i>, Oxford University Press, 2007. 6. J. Leonard, B. Lygo and G. Procter Nelson, <i>Advanced Practical Organic Chemistry</i>, Thomes Ltd. UK, 2001. 		
Teaching Learning Strategies		
<ol style="list-style-type: none"> 1. Lectures 2. Group Discussion 3. Laboratory work 4. Seminar/ Workshop 		
Assignments: Types and Number with Calendar		
<ol style="list-style-type: none"> 1. Lab activities and practical performance from week 1 to week 16. 2. Literature review based assignment relevant to the course will also be given during the course. 3. Maintain record of all Practicals in note book under the following headings: Theory, Procedure, Chemicals, Observations and Results, Precautions 		

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