

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



BS Chemistry Semester-VI					
Programme	BS Chemistry	Course Code	Chem-393	Credit Hours	2
Course Title	Applications of Green Solvents		Course Type	Major Elective	
Course Introduction					
<p>This course is aimed to make students learn about the applications of green solvents in various chemical processes. The students will explore the principles and applications of green solvents in various industries including chemistry, chemical engineering, and environmental science. Students will learn about the properties, advantages and limitations of green solvents as well as their role in sustainable development. The course outline is as follows:</p> <p>Green solvents in green chemistry, Water as solvent of nature, Water as reaction medium in synthetic process, Green solvents in extraction and purification of bioactive compounds from natural materials, Ionic liquids as solvents and catalysts in green synthesis, Deep eutectic solvents in green organic synthesis, Applications of supercritical fluids, Ionic liquids in electrochemistry, Green solvents for biorefineries, Green solvents for pharmaceutical industry, Green solvents for biocatalysis.</p>					
Learning Outcomes					
<p>On the completion of the course, the students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the principles of green solvents and their importance in sustainable development 2. Analyze the applications of green solvents in various industries including chemistry, chemical engineering, and environmental science 3. Evaluate the environmental and economic benefits of using green solvents 4. Design and develop sustainable processes using green solvents 					
Course Content				Assignments/Readings	
Week 1	Green solvents in green chemistry			Related reading	
Week 2	Water as solvent of nature			Related reading	
Week 3	Water as reaction medium in synthetic process			Related reading	
Week 4	Green solvents in extraction and purification of bioactive compounds from natural materials			Related reading	
Week 5	Ionic liquids as solvents and catalysts in green synthesis			Related reading	
Week 6	Ionic liquids as solvents and catalysts in green synthesis			Related reading	
Week 7	Deep eutectic solvents in green organic synthesis			Related reading	
Week 8	Mid-term Examination				
Week 9	Applications of supercritical fluids			Related reading	
Week 10	Ionic liquids in electrochemistry			Related reading	
Week 11	Ionic liquids in electrochemistry			Related reading	
Week 12	Green solvents for biorefineries			Related reading	

Week 13	Green solvents for biorefineries	Related reading	
Week 14	Green solvents for pharmaceutical industry	Related reading	
Week 15	Green solvents for biocatalysis	Related reading	
Week 16	Final term Examination		
Textbooks and Reading Material			
<p>1. Ali Mohammad, Inamuddin, (2012), Green solvents: Properties and applications in chemistry, Springer Publishers</p> <p>2. William M. Nelson, (2003), Green solvents for chemistry Perspective and practice, Oxford University Press.</p> <p>3. Francesca M. Kerton, Ray Marriott, (2013), Alternative solvents for green chemistry, 2nd Edition, RSC Green Chemistry Series.</p>			
Teaching Learning Strategies			
Class lecture method, which includes seminars, discussions, assignments and projects. Audio-visual tools will be used where necessary			
Assignments: Types and Number with Calendar			
<ol style="list-style-type: none"> 1. Written Task 2. Presentation 3. Tutorials 4. Solving related exercises 			
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-394	Credit Hours	1
Course Title	Green Solvent Lab-II		Course Type	Major Elective	
Course Introduction					
<p>This course is aimed to make students learn about the practical applications of green solvents in various chemical processes. The students will explore the principles and applications of green solvents in various industries including chemistry, chemical engineering, and environmental science. Students will learn about the properties, advantages and limitations of green solvents as well as their role in sustainable development. The practical work according to the following outline will be conducted:</p> <p>Synthesis of organic compounds using water as reaction medium, Ionic liquids mediated synthesis of coumarins, Deep eutectic solvents for synthesis of organic compounds like coumarin or quinoline, Ionic liquids for extraction purpose, Applications of supercritical fluids</p>					
Learning Outcomes					
<p>On the completion of the course, the students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the principles of green solvents and their importance in sustainable development 2. Practically use green solvents for synthesis, extraction, biorefineries and various applications 3. Evaluate the environmental and economic benefits of using green solvents 4. Design and develop sustainable processes using green solvents 					
Textbooks and Reading Material					
<ol style="list-style-type: none"> 1. Ali Mohammad, Inamuddin, (2012), Green solvents: Properties and applications in chemistry, Springer Publishers 2. William M. Nelson, (2003), Green solvents for chemistry Perspective and practice, Oxford University Press. 3. Francesca M. Kerton, Ray Marriott, (2013), Alternative solvents for green chemistry, 2nd Edition, RSC Green Chemistry Series. 					
Teaching Learning Strategies					
Class lecture method, which includes seminars, discussions, assignments and projects. Audio-visual tools will be used where necessary					
Assignments: Types and Number with Calendar					
<ol style="list-style-type: none"> 1. Written Task 2. Presentation 3. Tutorials 4. Solving related exercises 					

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.