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



Program	BS Chemistry Semester-III				
110814111	me BS Chemistry	y Course Code	Chem-291	Credit Hours	2
Course Ti	tle Introduction to	Green Chemistry	Course Type	Major Elec	ctive
Course Introduction					
issues with chemical p substances. materials a help design Introductio economy, r renewable	e presents the fundame n efforts that can be roducts and processes. While there are ma nd processes on huma and create products as n to Green Chemist non-hazardous synthes energy consumption ty, real-time analysis, a	taken to create solution that reduce or elimination of the reduce or elimination of the reduce or elimination of the reduce of the environ- s such. The course con- try, principles of Greater the reduce of the reduce of the rest of the reduce of the reduce of the rest of the reduce of the reduce of the reduce of the reduce of the reduce of the reduce of the reduce of the reduce of the reduce of the reduce of the reduce of the reduce of the reduce of the reduce	ions. Green Cha nate the use and tools available ronment, there a tents are provide een Chemistry; d solvents, minin naterials, simpl	emistry is the de generation of ha to assess the in the few tools availed below. waste reduction nal energy consu	esign of azardous npact of ilable to n, atom umption,
uegrauaom	ty, real-time analysis,	Learning Outcor			
 On the completion of the course, the students will be able to: Demonstrate a broader and deeper understanding of the twelve principles of green chemistry Evaluate technologies and products by applying the methods and tools of green chemistry in the practice of chemistry. Evaluate, whether a chemical transformation can be classified as environment friendly and sustainable, or which parameters need to be optimized in order to achieve this. Explain how the application of green chemistry principles can address sustainability issues 					
4.	achieve this.	_	eters need to b	e optimized in	order to
4.	achieve this. Explain how the appl	lication of green chem	eters need to b	e optimized in	order to inability
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Week 13	Reduce derivatives or minimization of steps (simple	Related reading		
	chemistry) and design for degradability			
Week 14	Accident Prevention and real time analysis	Related reading		
Week 15	Current trends, developments and innovations in	Related reading		
	green chemistry			
Week 16	Final term Examination			

Textbooks and Reading Material

1. Sankar P. Day, Nayim Sep, (2021), A Textbook of Green Chemistry, Edition 1st, Techno World Publisher.

2. M. Lancaster, (2016), Green Chemistry: An Introductory Text, Edition 3, RSC Publishers.

3. P. Anastas and P. Trevorrow, (2013), Handbook of Green Chemistry, Green Processes, Designing Safer Chemicals, Wiley Publishers.

4. A. Lapkin and D. Constable, (2008), *Green Chemistry Metrics: Measuring and Monitoring Sustainable Processes*, Wiley Publishers.

5. J. H. Clark, A. Hunt, C. Topi, G. Paggiola and J. Sherwood, (2017), *Sustainable Solvents: Perspectives from Research, Business and International Policy (Green Chemistry Series),* RSC Publishers.

Teaching Learning Strategies

Class lecture method, which includes seminars, discussions, assignments and projects. Audiovisual tools will be used where necessary

Assignments: Types and Number with Calendar

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.		

Duc	BS Chemistry Semester-III					
Program	me BS	Chemistry	Course Code	Chem-292	Credit Hours	1
Course T	e Title Green Chemistry Laboratory		Course Type	Major Elective		
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Week 10	Green synthesis of metal or metal oxide	Related reading
	nanoparticles of Ag/Cu/Zn	
Week 11	Green synthesis of metal or metal oxide	Related reading
	nanoparticles of Ag/Cu/Zn	
Week 12	Reduction of dyes using green reducing agents	Related reading
Week 13	Reduction of dyes using green reducing agents	Related reading
Week 14	Heterogeneous catalysis for oxime formation	Related reading
Week 15	Heterogeneous catalysis for oxime formation	Related reading
Week 16	Final term Examination	

Textbooks and Reading Material

1. Sally A. Henrie, (2015), *Green Chemistry-Laboratory Manual for General Chemistry*, Taylor & Francis CRC Press.

2. Syed Kazim Moosvi, Waseem Gulzar Naqash, Mohd. Hanief Najar, (2021), *Green Chemistry Principles and Designing of Green Synthesis*, De Gruyter publishers.

3. P. Anastas and P. Trevorrow, (2013), Handbook of Green Chemistry, Green Processes, Designing Safer Chemicals, Wiley Publishers.

4. A. Lapkin and D. Constable, (2008), *Green Chemistry Metrics: Measuring and Monitoring Sustainable Processes*, Wiley Publishers.

5. Anastas, Paul T, and John C Warner (2000), *Green Chemistry: Theory and Practice*, Oxford Academic Press.

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