

BS Chemistry Semester-VI					
Programme	BS Chemistry	Course Code	Chem-395	Credit Hours	3
Course Title	Green Chemistry and Sustainable Development Goals		Course Type	Major Elective	
Course Introduction					
<p>The course presents how green and sustainable chemistry can be a central driver in the circular economy and addressing and achieving the UN Sustainable Development Goals (UN SDGs). The course overviews the principles of green chemistry, linking these to the UN SDGs with a prime focus to enable the students to identify the critical areas in terms of sustainable development for new products, materials or processes. They have basic knowledge of how to apply the methods and interpret the results.</p> <p>Concept of green chemistry and sustainability, Issues regarding global sustainable development, UN sustainable development goals, role of green chemistry in attaining sustainable development goals, Concept of circular economy, environmental factor or E-factor, environmental quotient (EQ) or Q-value, Sustainable energy, fuels and chemicals, biomass as renewable energy resource, Green chemistry for waste water treatment, measuring reactions and process efficiency, legal and regulatory framework of chemical law and approval, processing of chemicals at scale, The chemist as responsible citizen</p>					
Learning Outcomes					
<p>On the completion of the course, the students will be able to:</p> <ol style="list-style-type: none"> 1. Reflect on new developments as well as to design trans disciplinary projects and can also perceive possible effects of developments in the field of chemistry on society, the environment, and the economy. 2. Aware of their responsibility as chemists for social development. 3. Effectively communicate detailed, complex, green and sustainable chemistry research concepts to both experts and non-experts through the application of a variety of key transferable skills 					
Course Content				Assignments/Readings	
Week 1	Concept of green chemistry and sustainability			Related reading	
Week 2	Issues regarding global sustainable development			Related reading	
Week 3	UN sustainable development goals			Related reading	
Week 4	Role of green chemistry in attaining sustainable development goals			Related reading	
Week 5	Concept of circular economy			Related reading	
Week 6	Environmental quotient (EQ) or Q-value waste			Related reading	
Week 7	Environmental factor or E-factor			Related reading	
Week 8	Mid-term Examination				
Week 9	Sustainable energy, fuels and chemicals			Related reading	
Week 10	Biomass as renewable energy resource			Related reading	
Week 11	Green chemistry for waste water treatment			Related reading	

Week 12	Measuring reactions and process efficiency	Related reading	
Week 13	Processing of chemicals at scale	Related reading	
Week 14	Legal and regulatory framework of chemical law and approval,	Related reading	
Week 15	The chemist as responsible citizen	Related reading	
Week 16	Final term Examination		
Textbooks and Reading Material			
<p>1. Neil Winterton, (2021), <i>Chemistry for sustainable technologies: A foundation</i>, RSC Publishers.</p> <p>2. Mark Anthony, Benvenuto Kommas, (2022). <i>Green Chemistry and UN sustainability development goals</i>, De Gruyter Publishers.</p> <p>3. Nancy E. Carpenter, (2014). <i>Chemistry for sustainable energy</i>, CRC Press Taylor & Francis Group.</p> <p>4. P. Anastas and P. Trevorrow, (2013), <i>Handbook of Green Chemistry, Green Processes, Designing Safer Chemicals</i>, Wiley Publishers.</p> <p>5. A. Lapkin and D. Constable, (2008), <i>Green Chemistry Metrics: Measuring and Monitoring Sustainable Processes</i>, Wiley Publishers.</p> <p>6. J. H. Clark, A. Hunt, C. Topi, G. Paggiola and J. Sherwood, (2017), <i>Sustainable Solvents: Perspectives from Research, Business and International Policy (Green Chemistry Series)</i>, RSC Publishers.</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.