



**CALICUT UNIVERSITY – FOUR-YEAR UNDER  
GRADUATE PROGRAMME (CU-FYUGP)**

**BSc CHEMISTRY**

Programme	B. Sc. Chemistry				
Course Title	ENVIRONMENTAL CHEMISTRY				
Type of Course	MDC				
Semester	I				
Academic Level	100-199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	3	3	-	-	45
Pre-requisites	What is Environment. Basic idea of environmental pollution.				
Course Summary	This course ensures that the students acquire a profound knowledge and understanding on environmental pollution and the necessity of controlling environmental pollution.				

**Course Outcomes (CO):**

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Acquire the knowledge on ecosystem.	U	C	Instructor-created exams / Quiz
CO2	Recall the technical/scientific terms involved in pollution.	U	C	Instructor-created exams / Quiz
CO3	Recognize different types of toxic substances that cause environmental pollution.	U	C	Instructor-created exams / Assignment
CO4	Understand the effects of environmental pollution.	U	C	Seminar Presentation / Viva
CO5	Understand various pollution control measures.	U	C	Instructor-created exams / Quiz
CO6	Discuss and report local and global environmental issues based on the knowledge gained throughout the course.	Ap	P	Group discussion and Seminar presentation/Viva

\* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C)  
 # - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P)  
 Metacognitive Knowledge (M)

**Detailed Syllabus:**

Module	Unit	Content	Hrs	Mark
<b>I</b>	<b>Introduction to Environmental Chemistry</b>		<b>9</b>	<b>18</b>
	1	Environmental segments-Atmosphere, Hydrosphere, Lithosphere, Biosphere	2	
	2	Interaction between different environmental spheres Concept of ecosystem, abiotic and biotic components	2	
	3	Composition of Air, Water and Soil	2	
	4	Environmental pollution – Concepts and definition – Pollutant, contaminant, receptor and sink	1	
	5	Classification of pollutants – Global, regional, local, persistent and non-persistent pollutants.	1	
	6	Types of pollution	1	
<b>II</b>	<b>Air Pollution</b>		<b>9</b>	<b>18</b>
	7	Tropospheric pollution – Gaseous air pollutants – Hydrocarbons, oxides of sulphur, nitrogen and carbon (Elementary idea only)	2	
	8	Global warming, green house effect, acid rain	1	
	9	Particulates – Smog: London smog and photochemical smog –	2	
	10	stratospheric pollution - depletion of ozone layer, chlorofluorocarbons - Automobile pollution.	2	
	11	Control of air pollution	2	
<b>III</b>	<b>Water Pollution</b>		<b>10</b>	<b>20</b>
	12	Impurities in water – cause of pollution – natural and anthropogenic – Marine water pollution – Underground water pollution.	1	
	13	Source of water pollution – Industrial waste, Municipal waste, Agricultural waste, Radioactive waste, Petroleum, Pharmaceutical, heavy metal, pesticides, soaps and detergents.	2	
	14	Types of water pollutants: Biological agents, physical agents and chemical agents – Eutrophication- biomagnification and bioaccumulation.	2	
	15	Water quality parameters: DO, BOD, COD, alkalinity, hardness, chloride, fluoride and nitrate. Toxic metals in water and their effects: Cadmium, lead and oil pollution in water.	3	
	16	Water pollution control methods	2	

IV	<b>Soil, Thermal, and Radioactive Pollutions</b>		<b>8</b>	<b>14</b>
	18	Soil pollution: Sources by industrial and urban wastes. Non-degradable, degradable and biodegradable wastes. Hazardous waste.	2	
	19	Pollution due to plastics, pesticides, biomedical waste and <i>e-waste</i> (source, effects and control measures) – Control of soil pollution - Solid waste Management – Open dumping, Landfilling, Incineration, Re-use, reclamation, recycle, composting.	3	
	20	Thermal pollution – definition, sources, harmful effects and prevention.	1	
	21	Radioactive pollution (source, effects and control measures) – Hiroshima, Nagasaki and Chernobyl accidents (brief study).	2	
V	<b>Open Ended Module: Environmental issues</b>		<b>9</b>	
	1	Environment and society  Pollution case studies: Chernobyl disaster, Bhopal tragedy, Endosulfan disaster in Kerala (brief study) etc.		

### References

1. A. K. De, *Environmental Chemistry*, 6<sup>th</sup> Edn., New Age International.
2. A. K. Ahluwalia, *Environmental Chemistry*, The Energy and Resources Institute, 2017.
3. Balram Pani, *Textbook of Environmental Chemistry*, I. K. International Pvt Ltd, 2010.
4. S.K. Banergy, *Environmental Chemistry*, 2<sup>nd</sup> Edn., Prentice-Hall of India Pvt. Ltd., New Delhi, 2005.
5. V.N. Bashkin, *Environmental Chemistry: Asian Lessons*, Springer Science & Business Media, 2003.
6. S.E. Manahan, *Environmental Chemistry*, 8<sup>th</sup> Edn., CRC Press, Florida, 2004.
7. Balram Pani, *Textbook of Environmental Chemistry*, I. K. International Pvt Ltd, 2010.
8. J. M. H. Selendy, *Water and Sanitation-Related Diseases and the Changing Environment*, John Wiley & Sons, Inc.
9. P. K. Goel, *Water Pollution: Causes, Effects and Control*, New Age International, 2006.
10. V. N. Bashkin, *Environmental Chemistry: Asian Lessons*, Springer Science & Business Media, 2003.
11. Pallavi Saxena, Vaishali Naik, *Air Pollution: Sources, Impacts and Controls*, CAB International, 2018.
12. Gabi Mocatta (2015) *Environmental Journalism*, Deakin University Open School of Journalism.
13. D. S. Poornananda (2022), *Environmental Journalism: Reporting on Environmental Concerns and Climate Change in India*, SAGE Publishing India'
14. Frome, Michael. (1998) *Green Ink: An Introduction to Environmental Journalism*. Salt Lake City: University of Utah Press.
15. Sachsman, D. B. & Valenti, J. M. (2020). *Routledge handbook of environmental journalism*. New York, NY: Routledge.
16. Blum, D., Henig, R., Knudson, M., (2005). "A Field Guide for Science Writers." Oxford University Press; 2nd edition.
17. Hansen, Anders. (2010) *Environment, Media and Communication*. London: Routledge

**Mapping of COs with PSOs and POs :**

	PSO 1	PSO 2	PSO 3	PSO4	PS O5	PSO 6	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	1	-	-	-	1	1	1			2	1		
CO 2	1		-	-	1	1	1			1	1	1	1
CO 3	-	-		1	2	2	1			2	2	1	
CO 4	-	-			1	2	1			1	1	1	1
CO 5	-		-	1	2	2	1			1		1	1
CO 6	-	-	-	1	2	2	1			1	1	1	1

**Correlation Levels:**

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

**Assessment Rubrics:**

- Quiz / Assignment/ Quiz/ Discussion / Seminar
- Midterm Exam
- Programming Assignments (20%)
- Final Exam (70%)

**Mapping of COs to Assessment Rubrics :**

	Internal Exam	Assignment/viva	Quiz/seminar/Group discussion	End Semester Examinations
CO 1	✓		✓	✓
CO 2	✓		✓	✓
CO 3	✓	✓		✓
CO 4		✓	✓	✓
CO 5	✓		✓	✓
CO 6		✓	✓	