University of Kerala

Discipline	CHEMISTRY				
Course Code	**UK1MDCCHE100**				
Course Title	**FUNDAMENTAL ASPECTS OF ENVIRONMENTAL CHEMISTRY**				
Type of Course	MDC				
Semester	1				
Academic Level	100 - 199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	3	3 hours	-	-	3
Pre-requisites	1. Basic knowledge and interest in science				
Course Summary	Includes a brief introduction of environmental components, different types of pollution and some major environmental disasters.				

Detailed Syllabus:

Module	Unit	Content FUNDAMENTAL ASPECTS OF ENVIRONMENTAL CHEMISTRY	45 Hrs
I		**BASIC CONCEPTS OF ENVIRONMENT**	**9**
	1	Types of Environments - Biotic and Abiotic, Environmental segments- Lithosphere, Hydrosphere, Biosphere and Atmosphere.	3
	2	Layers of Lithosphere, Layers of Atmosphere- Troposphere, Stratosphere, Mesosphere, Thermosphere and Exosphere.	3
	3	Meaning of Ecology - Structure and Function of Ecosystem- Producers, Consumers, Decomposers.	2
	4	Ecological Succession- Food Chain and Ecological Pyramids.	1
II		**AIR POLLUTION**	**6**
	5	Pollution, Pollutants and its Classification, Contaminants.	2
	6	Air Pollution - Types of Gaseous Air pollutants-CO, CO_2, NO, NO_2, SO_2, SO_3, Smog - Sources and Effects on Environment.	2
	7	Consequences of Air pollution - Global warming, Greenhouse effect, Acid rain and Importance of Ozone layer.	2
III		**WATER & SOIL POLLUTION**	**12**
	8	Water Quality Parameters- Dissolved Oxygen, BOD, COD, pH, Turbidity, Conductivity, Salinity (Qualitative idea only), Eutrophication.	3
	9	Major Water pollutants – Industrial Wastes, Sewage, Agricultural Pollutants, Radioactive Wastes, Detergents - Sources and Effects.	3

	10	Treatment of Waste Water- Filtration using Activated Charcoal and Ion Exchange Resins, Electrodialysis and Reverse osmosis	3
	11	Composition of soil- Inorganic and Organic Components in Soil- Micro and Macro nutrients,	3
	12	Soil pollutants - Industrial Wastes, Domestic Wastes, Agricultural Wastes and Radioactive Wastes - Sources and Effects.	3
	13	Solid Waste Management - Land Filling, Recycling, Incineration and Composting.	3
IV	**ENVIRONMENTAL DISASTERS**		**9**
	14	Definition and types of disasters – Natural and Manmade.	2
	15	Disaster management - Mitigation, Preparedness, Response and Recovery.	3
	16	Major environmental disasters - Three Miles Island accident, Endosulfan tragedy in Kerala, Chernobyl Incident, Minamata disease.	4
V	**OPEN ENDED MODULE:**		**9**
	17	Case Studies, Debates, Simulation Games, local field Trips, Project-Based Learning, Artistic Expression, Community Engagement, Critical Thinking Exercises etc. **(Or any other activities may be suggested by the teacher)**	

References

1. A.K. De, "*Environmental Chemistry*"
2. H.M. Saxena, "*Environmental Geography*".
3. G.W. Vanloon, S. J. Duffy, "*Environmental Chemistry – a global perspective*".
4. P.K. Gupta, "*Methods in Environmental Analysis Water, Soil and Air*".
5. V.P. Kudesia, "*Environmental Chemistry*".
6. G.S. Sodhi, "*Fundamental Concepts of Environmental Chemistry*".
7. V Subramanian, "*A Text Book of Environmental Chemistry*", Wiley 2020.
8. C. Baird and M. Cann, "*Environmental Chemistry*", W.H. Freeman and Company, 2012.

Course Outcomes

No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
CO-1	Understand the structure and composition of the atmosphere.	U	PSO-1,2,3
CO-2	Observe, realise and enlist the causes of air pollution.	R, U	PSO-1,2,3

CO-3	Understand the qualities of water, identify the causes and effects of water pollution and acquire knowledge of waste water treatment.	U, R	PSO-1,2,3,4
CO-4	Acquire a basic knowledge of Soil Pollution	U, Ap	PSO-1,2,3,4
CO-5	Review major environmental disasters	R, An	PSO-1,2,3
CO-6	Gain a holistic understanding of pollution and develop skills to address it	U, An	PSO-1,2,3,4,5

R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create

Name of the Course: ENVIRONMENTAL CHEMISTRY

Credits: 3:0:0 (Lecture:Tutorial:Practical)

CO No.	CO	PO/PSO	Cognitive Level	Knowledge Category	Lecture (L)/ Tutorial (T)	Practical (P)
1	CO-1	PO-1,6 PSO-1,2,3	U	F, C, M	L	-
2	CO-2	PO-1,6 PSO-1,2,3	R, U	F, C	L	-
3	CO-3	PO-1,6 PSO-1,2,3,4	U, R	F, C	L	-
4	CO-4	PO-1,6 PSO-1,2,3,4	U, Ap	F, C	L	-
5	CO-5	PO-1,6 PSO-1,2,3	R, An	F, C	L	-
6	CO-6	PO-1,2,3,4,5,6,8 PSO-1,2,3,4,5	U, An	F, C, P	L	P

F-Factual, C- Conceptual, P-Procedural, M-Metacognitive

Mapping of COs with PSOs and POs:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8

CO 1	2	1	2	-	-	1	-	-	-	-	2	-	-
CO 2	1	2	3	-	-	1	-	-	-	-	2	-	-
CO 3	1	1	1	1	-	1	-	-	-	-	2	-	-
CO 4	1	1	1	1	-	1	-	-	-	-	2	-	-
CO 5	1	1	1	-	-	1	-	-	-	-	2	-	-
CO 6	1	1	1	1	1	1	1	2	3	2	2	-	3

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
- Final Exam

Mapping of COs to Assessment Rubrics:

	Internal Exam	Assignment	Project Evaluation	End Semester Examinations
CO 1	✓	✓		✓
CO 2	✓	✓		✓
CO 3	✓			✓
CO 4	✓	✓		✓
CO 5	✓			✓
CO 6	✓	✓	✓	✓