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	✓			✓

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.	2
	9	Major Water pollutants – Industrial Wastes, Sewage, Agricultural Pollutants, Radioactive Wastes, Detergents - Sources and Effects.	2
	10	Treatment of Waste Water- Filtration using Activated Charcoal and Ion Exchange Resins, Electrodialysis and Reverse osmosis	2
	11	Composition of soil- Inorganic and Organic Components in Soil- Micro and Macro nutrients,	2
	12	Soil pollutants - Industrial Wastes, Domestic Wastes, Agricultural Wastes and Radioactive Wastes - Sources and Effects.	2
	13	Solid Waste Management - Land Filling, Recycling, Incineration and Composting.	2
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	Analyze the structure and functioning of ecosystems by examining biotic and abiotic components, environmental segments, layers of the lithosphere and atmosphere, ecological succession, food chains, and ecological pyramids.	An	PSO-1,2,3
CO-2	Analyze the types, sources, and environmental consequences of air pollutants and contaminants, including their role in phenomena such as global warming, acid rain, smog formation, and ozone layer depletion.	An	PSO-1,2,3
CO-3	Critically evaluate water and soil quality parameters, identify major pollutants and their sources, and design effective waste water and solid waste treatment strategies using advanced techniques to promote sustainable environmental management.	E	PSO-1,2,3,4

CO-4	Critically analyze various natural and manmade disasters, evaluate disaster management strategies including mitigation, preparedness, response, and recovery, and creatively propose informed solutions by examining major environmental disasters.	C	PSO-1,2,3,4
CO-5	Gain a holistic understanding of pollution and develop skills to address it	C	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	An	F, C, M	L	-
2	CO-2	PO-1,6 PSO-1,2,3	An	F, C	L	-
3	CO-3	PO-1,6 PSO-1,2,3,4	E	F, C	L	-
4	CO-4	PO-1,6 PSO-1,2,3,4	C	F, C	L	-
5	CO-5	PO-1,6 PSO-1,2,3	C	F, C	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	-	-