University of Kerala

Discipline	**BOTANY**				
Course Code	**UK3DSCBOT204**				
Course Title	**ENVIRONMENTAL SCIENCES**				
Type of Course	**DSC**				
Semester	**III**				
Academic Level	**200 - 299**				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	04	03 Hours	-	02 Hours	05 Hours
Pre-requisites	No Pre-requisites				
Course Summary	This course equips the students to identify Natural resources and key features of ecosystems and understand the interrelationships between organisms within an ecosystem. Explains sustainable development of nature through biodiversity conservation. This course equips the students with knowledge about pollution, its causes and methods for prevention and control.				

Detailed Syllabus:

Module	Unit	Content	Hrs
I		**Natural Resources and Conservation**	**06**
	1	Renewable and Non-renewable resources, natural resources - Land, Water, Forests -, Energy, Plants & Wildlife.	
	2	Degradation of natural resources (Land, water, flora and fauna), Causes – habitat fragmentation, invasive species, population explosion, over-exploitation, deforestation, agriculture mismanagement, desertification, overgrazing, soil erosion, mining, urbanization and industrialization, depletion of water resources	
	3	Conservation of Natural resources and sustainable lifestyles. Afforestation, regeneration of wasteland, rainwater harvesting, use of renewable resources, tidal and wind; biodiesel, biofuels. (brief account only)	
II		**Ecosystem Ecology**	**12**
	4	Definition, Biotic and abiotic components- Food chains, Food web & ecological Pyramids -Energy flow in an ecosystem–GPP, NPP	
	5	Biogeochemical cycles– Nitrogen, Phosphorus – biomagnification, eutrophication	
	6	Ecological succession-Definition, primary and secondary succession, climax concept - hydrosere, xerosere	
	7	Types of ecosystems (structure & functions) - Forest, Grassland, Desert, Aquatic – Marine, Freshwater, Estuaries, Mangrove forest, Salt marshes,	

III	**Interactions and Adaptations**		
	8	Species interactions : Herbivory – Mechanical, Chemical defense, Competition – introduced species, Mutualism – Pollination syndromes, Dispersive mutualism, Defensive mutualism, Symbiosis (Lichens,Mycorrhizae), Parasitism – holoparasites, hemiparasites Commensalism, carnivory	**06**
	9	Morphological, anatomical & physiological adaptations of – Hydrophytes, Xerophytes, Halophytes, Epiphytes, Parasites	
IV	**Biodiversity Conservation**		
	10	Definition- genetic, species and ecosystem diversity, keystone species, indicator species, umbrella species	**06**
	11	Hot spots – in India, Endemism – Western Ghats, IUCN, Red list – categories, Red data Book	
	12	Biodiversity Conservation: In-situ (National parks, Wildlife sanctuaries, Biosphere reserves) and Ex-situ conservation (botanical gardens, seed bank), World Heritage Sites in India, Ramsar convention	
	13	Major biodiversity conservation Movements in India - Chipko movement, Silent Valley Movement, Narmada BachaoAndolan	
V	**Environmental Pollution**		**15**
	14	Definition, causes and types – Air, Water, Soil, Noise, Thermal , Radioactive, Light. Case study : DDT	
	15	Global warming, Climate change, Ozone layer depletion,	
	16	Environmental policy in India	

Practicals		
	1. Study of ecological and anatomical modifications of Xerophytes, Hydrophytes, Halophytes, Epiphytes and Parasites. 2. Conduct a study tour to minimum 2 ecosystems 3. One day visit to ecologically significant location (National parks/ Botanical garden) 4. Identify and prepare a list of IUCN categorized tree/plants list in the campus or the nearest region 5. Conduct a debate/discussion on current environmental issues 6. Visit a local polluted site and report major pollutants	**30**

Suggetsted Reading

1. Kumar, H. D. 2000. Modern Concepts of Ecology. Vikas Publishing House, New Delhi
2. Ahluwalia VK &Sunitha Malhotra (2009). Environmental science, Ane Books PvtLtd.
3. Krishnamoorthy K V (2012)An Advanced text book of Biodiversity Conservation,
4. Kumaresan B. (2009). Plant Ecology & Phytogeography– Rastrogi Publications :
5. Misra S P and Pandey S N. (2009). Essential Environmental studies, Ane Books Pvt.Ltd
6. Odum Eugene P (2018)– Fundamentals of Ecology, 5 thEdn. Philladephia&Saunders,
7. Principles and Practise, Oxford& IBH publishers Co Pvt. Ltd

References

1. Prithipal Singh, (2007). An Introduction to Biodiversity. Ane Books Pvt.Ltd
2. .Sharma, P. D. 2004. Environmental Biology, Himalaya Publications.
3. Stiling, P. 2012. Ecology: Global Insights and Investigations, McGraw- Hill Companies, NewYork.
4. Chapman, J. and Reiss, M. (2000). Environmental Biology. Cambridge University Press
5. AravindKumar.(2009).Pollution and Biodiversity, Biosocial aspects, , DayaPublishingHouse
6. 14. Hardy, J.T. 2003. Climate Change: Causes, Effects and Solutions. John Wiley & Sons.

Weblink

1. https://www.britannica.com/science/ecology
2. https://plato.stanford.edu/entries/ecology

Course Outcomes

No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
CO-1	Define and explain natural resources. Discuss the factors affecting the availability of natural resources, their conservation and management.	R, U	PSO-1,2
CO-2	Assess the dynamics and types of ecosystems.Identify key features of ecosystems and understand the interrelationships between organisms within a simple ecosystem.	R, U,C	PSO-5
CO-3	Interpret and compare the species interactions and adaptations	U,E	PSO-5
CO-4	Analyze various threats to our biodiversity and able to suggest measures for conservation Strategies.	R,U,Ap	PSO-5
CO -5	Students are able to take part in the message of sustainable use of resources and conservation of biodiversity to the public and young generation	R,U,E	PSO-5,6,7

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

Name of the Course: Environmental sciences
Credits: 3:0:1 (Lecture:Tutorial:Practical)

CO No.	CO	PO/PSO	Cognitive Level	Knowledge Category	Lecture (L)/Tutorial (T)	Practical (P)
1	1	1,2	R, U	F,C	L,T	

2	2	5	R, U,C	F,C	L,T	
3	3	5	U,E	F,C	L,T	P
4	4	5	R,U,Ap	C.P	L,T	
5	5	5,6,7	R,U,E	C.P	L,T	

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

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		✓	✓	✓