

**THE MAHATMA GANDHI UNIVERSITY
UNDERGRADUATE PROGRAMMES (HONOURS)
SYLLABUS**

MGU-UGP (Honours)

(2024 Admission Onwards)



Faculty: Science

Expert Committee: Botany

Subject: Environmental Science

**Mahatma Gandhi University
Priyadarshini Hills
Kottayam – 686560, Kerala, India**

Syllabus Index

Name of the Minor: **Environmental Science**

Semester 1

Course Code	Title of the Course	Type of the Course DSC, MDC, SEC etc.	Credit	Hours/ week	Hour Distribution /week			
					L	T	P	O
MG1DSCEVS100	Environmental biology	DSC B	4	5	3		2	

Semester: 2

Course Code	Title of the Course	Type of the Course DSC, MDC, SEC etc.	Credit	Hours/ week	Hour Distribution /week			
					L	T	P	O
MG2DSCEVS100	Ecology	DSC B	4	5	3		2	

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Semester: 3

Course Code	Title of the Course	Type of the Course DSC, MDC, SEC etc.	Credit	Hours/ week	Hour Distribution /week			
					L	T	P	O
MG3DSCEVS200	Natural resources and conservation	DSC B	4	5	3		2	

Semester: 4

Course Code	Title of the Course	Type of the Course DSC, MDC, SEC etc.	Credit	Hours/ week	Hour Distribution /week			
					L	T	P	O
MG4DSCEVS200	Environmental pollution and management	DSC C	4	5	3		2	

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Semester: 7

Course Code	Title of the Course	Type of the Course DSC, MDC, SEC etc.	Credit	Hours/ week	Hour Distribution /week			
					L	T	P	O
MG7DSEEVS400	Environmental legislation and management	DSE	4	4	4			
MG7DSEEVS401	Environmental conservation and management		4	4	4			
MG7DSEEVS402	Remote sensing, GIS and EIA		4	4	4			



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Programme						
Course Name	Environmental biology					
Type of Course	DSC B					
Course Code	MG1DSCEVS100					
Course Level	100					
Course Summary	<p>This course provides students with an understanding on diverse group of plants, their survival and their interactions in different environments.</p> <p>Throughout the course, students will engage in discussions aimed at understanding the intricate relationships between living organisms and their environment, and the importance of sustainable practices to protect our planet's ecosystems.</p>					
Semester	I	Credits			4	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3		1		75
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand the principles, scope and history of environmental science.	K, U	PO8, PO10
2	Compare the structure, function and characteristics of different types of ecosystems.	U	PO1, PO2
3	Analyze the biogeochemical cycles, trophic relations and productivity.	U, An	PO7, PO10
4	Describe various types of biodiversity and composition.	K, U	PO8, PO10
5	Define the various indicator species based on their status. Distinguish between biodiversity in-situ and ex-situ conservation. Analyze the depletion-causes and consequences of biodiversity.	U, An	PO2, PO8, PO10
*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT

Module	Units	Course description	Hrs	CO No.
1	Environment and Ecology (15 hours)			
	1.1	Definition, principles and scope of environmental science. History of ecology, subdivisions of ecology - autoecology and synecology.	5	1
	1.2	Ecosystems Definition, components, structure, function and size of ecosystems Types of ecosystems - aquatic and terrestrial ecosystems.	5	1
	1.3	Structure, function and characteristics of forest ecosystem - temperate and tropical forests, arctic and alpine forests, tundras. Grassland ecosystems – tropical and temperate. Desert ecosystem. Freshwater and marine ecosystem. Wetland ecosystem, mangrove ecosystem, estuarine ecosystem.	5	2
2	Ecosystem processes (15 hours)			
	2.1	Nutrient cycles, energy flow, homeostasis in the ecosystem.	5	2

	2.2	Biogeochemical cycles (gaseous - C, N, O; sedimentary cycles – S, P).	5	2
	2.3	Trophic relations, food chain, food-web and ecological pyramids, concept and measurement of productivity.	5	2
	Biodiversity and conservation (15 Hours)			
3	3.1	Biodiversity Introduction, definition, types of biodiversity - species, genetic and ecosystem diversity.	5	3
	3.2	Biodiversity conservation Key stone species, flag ship species, endemic species, endangered species - flora and fauna, ecological foot prints, red data book.	5	3
	3.3	Biodiversity hotspots, biodiversity depletion-causes and consequences. Conservation of biodiversity – in-situ, ex-situ.	5	3
Practical (30hrs)				
4	4.1	Aquatic ecosystems - survey, mapping, preservation, identification and abundance estimation of macrophytes, biomass and primary productivity; dissolved oxygen and pH.	8	
	4.2	Demonstration of various ecosystems.	7	
	4.3	Conservation Action Plan: Develop a proposal for a conservation initiative addressing a local biodiversity issue.	5	
	4.4	Field trip to biodiversity hotspot: Organize a visit to a local biodiversity-rich area (e.g., national park, wetland, or protected reserve) to observe and document various species, ecosystems, and their interdependencies.	10	

Teaching and Learning Approach	Classroom Procedure (Mode of transaction) Field based collection and interactions, Interactive lectures, flipped classroom, Lecture-based Learning, Project-Based Learning, Experiential Learning, Peer Teaching, invited lecture, group discussions, Discussion-based Learning, Inquiry-
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	Based Learning, Online Learning, Blended Learning, and other innovative learning approaches.
Assessment Types	<p>MODE OF ASSESSMENT</p> <p>A. Continuous Comprehensive Assessment (CCA)</p> <p>Theory: 25 marks</p> <ul style="list-style-type: none"> · Involvement and responses in class room transactions · Home Assignments/preparedness · Oral presentation/Viva/Quiz/Open book test/written test Field study report /Group discussion on a recent research or review article (≤ 5 years) related the course · Any other method as may be required for specific course / student by the course faculty <p>Practical: 15 marks</p> <ul style="list-style-type: none"> · Lab involvement and practical skills · Record/Any other method as may be required for specific course / student by the course faculty
	<p>B. End Semester Evaluation (ESE)</p> <p>Theory: 50 marks</p> <p>Short answer (10 out of 12): $10 \times 1 = 10$</p> <p>Short Essay (6 out of 8) : $6 \times 5 = 30$</p> <p>Essay (1 out of 2) : $1 \times 10 = 10$</p> <p>Practical: 35 marks</p> <ul style="list-style-type: none"> · Practical based assessments: 30 marks · Record: 5 marks

References

1. Abbasi S A, 1998. Environmental pollution and its control. Cogent International, Pondicherry.
2. Abbasi S A, 1998. Water Quality: Sampling and Analysis. Discovery publishing house, New Delhi.
3. Abbasi S A, Ramasami E, 1999. Biotechnological methods of pollution control. Universities Press, Hyderabad.
4. Agarwal K C, 1996. Biodiversity. Agrobotanical Publishers, Bikaner.
5. Agarwal K C, 1993. Environmental Biology (II Edn). Agrobotanical Publishers, Bikaner.
6. Apha, 1998. Standard methods for the examination of water and wastewater. Moduleed Book Press, Inc., Baltimore, Maryland, USA.
7. Baird C, 1999. Environmental chemistry. W H Freeman & Co., New York.
8. Barry R G, Chorley R J, 1998. Atmosphere, Weather and Climate (VII Edn). Routledge, London.

9. Bennet N H, 2001. Soil conservation for sustainable development. Agrobotanical Publishers, Bikaner.
10. Brady N C, 1996. Nature and Properties of Soil. Prentice Hall of India Pvt. Ltd. New Delhi.



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Programme						
Course Name	Ecology					
Type of Course	DSC B					
Course Code	MG2DSCEVS100					
Course Level	100					
Course Summary	This course delves into the intricate relationships between organisms and their environment, and helps in understanding the types and process of succession.					
Semester	II	Credits			4	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3		1		75
Pre-requisites, if any						

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COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand the definition, structure and characteristics of population. Describe the factors affecting population and population regulation.	K, U	PO1, PO3
2	Describe the concepts, structure, and gradients of community. Distinguish between the qualitative and quantitative characters of community.	U, A	PO1, PO2
3	Understand the definition, classification, processes, and kinds of succession. Understand the concept of climax, theories and its significance. Relate different types of interactions between species.	U, A	PO1, PO10
4	Understand the definition of Evolution and Darwin's postulates.	U	PO1, PO3
5	Distinguish between various Environmental Factors.	U, An	PO1, PO6, PO10
*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT

Module	Units	Course description	Hrs	CO No.
1	Population Ecology (7 hours)			
	1.1	Definition, structure and measurements - density, growth, natality, mortality. Population dispersal and distribution, population growth.	5	1
	1.2	Factors affecting population, carrying capacity, population regulation.	2	1
2	Community Ecology (13 hours)			
	2.1	Concepts of community, structure, community gradients - ecotone, edge effect, ecological niche, ecological equivalents, ecotypes.	4	2

	2.2	Characters of community: qualitative characters - floristic composition, stratification and periodicity.	4	2
	2.3	Quantitative characters - density, abundance and species diversity. Analysis - quadrat and transect method.	5	2
3	Ecological Succession (15 Hours)			
	3.1	Definition, classification, processes - nivation, invasion or migration, competition, climax.	(3 hrs)	3
	3.2	Concept of climax, theories and significance. Kinds of succession - hydrosere and xerosere.	(6 hrs)	3
	3.3	Interactions between species: competition, predation, mutualism, commensalism, parasitism and allelopathy.	(6 hrs)	3
Practical (30Hours)				
4	4.1	Vegetation analysis -association, diversity, frequency, density, productivity (primary) indirect estimation of standing crop.	10	
	4.2	Visit a conservation area (e.g. National park, wildlife sanctuary).	10	
	4.3	Demonstration of succession patterns.	10	
5	Teacher Specific component			

Teaching and Learning Approach	<p>Classroom Procedure (Mode of transaction)</p> <p>Field based collection and interactions, Interactive lectures, flipped classroom, Lecture-based Learning, Project-Based Learning, Experiential Learning, Peer Teaching, invited lecture, group discussions, Discussion-based Learning, Inquiry-Based Learning, Online Learning, Blended Learning, and other innovative learning approaches.</p>
Assessment Types	<p>MODE OF ASSESSMENT</p> <p>A. Continuous Comprehensive Assessment (CCA)</p> <p>Theory: 25 marks</p> <ul style="list-style-type: none"> · Involvement and responses in class room transactions · Home Assignments/preparedness

	<ul style="list-style-type: none"> ·Oral presentation/Viva/Quiz/Open book test/written test Field study report /Group discussion on a recent research or review article (≤ 5 years) related the course ·Any other method as may be required for specific course / student by the course faculty <p>Practical: 15 marks</p> <ul style="list-style-type: none"> ·Lab involvement and practical skills ·Record/Any other method as may be required for specific course / student by the course faculty
	<p>B. End Semester Evaluation (ESE)</p> <p>Theory: 50 marks</p> <p>Short answer (10 out of 12): $10 \times 1=10$</p> <p>Short Essay (6 out of 8) : $6 \times 5= 30$</p> <p>Essay (1 out of 2) : $1 \times 10= 10$</p> <p>Practical: 35 marks</p> <ul style="list-style-type: none"> ·Practical based assessments: 30 marks ·Record: 5 marks

References

1. Chakrabarti N K, 1994. Environmental Protection and Law. Abilash Publishing House, New Delhi.
2. Chapman J L, Reiss M J, 1992. Ecology: Principles and Applications. Cambridge University Press.
3. Claus W G, 1989. Understanding Microbes: A laboratory text book for Microbiology. W H Freeman and Co., New York.
4. Dash M C, 2001. Fundamentals of Ecology (II Edn). Tata McGraw-Hill, New Delhi.
5. De A K, 2003. Environmental Chemistry. New Age International Publishing, New Delhi.
6. Emiliani C, 1997. Planet Earth: Cosmology, Geology.
7. Freedman B (Ed), 1995. Environmental Ecology: The ecological aspects of pollution, disturbance and other stresses. Academic Press.
8. Gabriel Bitton, 1994. Water and Waste water Microbiology. John Wiley & sons, N. York.
9. Goel P K, Sharma K P, 1996. Environmental Guidelines and Standards in India. Techno Science Publications, Jaipur.



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Programme						
Course Name	Natural resources and conservation					
Type of Course	DSC B					
Course Code	MG3DSCEVS200					
Course Level	200					
Course Summary	This course provides students with an understanding on the concept of natural resources and their classification, the importance of natural resources for ecosystems and human well-being. Throughout the course, students will engage in analyzing the impact of human activities on natural resources and the environment and exploring strategies for the conservation and sustainable management of natural resources.					
Semester	III	Credits			4	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	1	-	75
Pre-requisites, if any						

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COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand the definition, classification and importance of natural resources.	U	PO1, PO6, PO7, PO10
2	Understand the importance of water resources and strategies for their conservation.	U	PO1, PO6, PO7, PO10
3	Understand the importance of soil resources and strategies	U	PO1, PO6, PO7, PO10

	for their conservation.		
4	Understand the importance of forest resources and strategies for their conservation.	U	PO1, PO6, PO7, PO10
5	Understand the importance of plants, animal and microbial resources and strategies for their conservation.	U	PO1, PO6, PO7, PO10

COURSE CONTENT

Module	Units	Course description	Hrs	CO No.
1	Introduction to Natural Resources (18 hours)			
	1.1	Definition and classification of natural resources. Renewable vs. non-renewable resources.	5	1
	1.2	Importance of natural resources for ecosystems and human societies.	3	1
	1.3	Plants and animal resources – Over exploitation, species extinction, control measures.	6	5
	1.4	Mangrove resources, microbial resources and their ecological significance.	4	5
2	Water Resources (9 hours)			
	2.1	Overview of global water resources.	2	2
	2.2	Challenges in water availability and quality.	2	2
	2.3	Strategies for water conservation and management. Wet land resources.	5	2
3	Soil and Forest Resources (18 hours)			
	3.1	Importance of soil for agriculture and ecosystems.	2	3
	3.2	Soil degradation and erosion.	3	3
	3.3	Soil conservation techniques and sustainable land management practices.	4	3
	3.4	Importance of forests: ecological, economic, and social aspects.	3	4
	3.5	Deforestation and its impacts.	2	4

	3.6	Sustainable forest management and reforestation initiatives.	4	4
4	Practicals (30 hours)			
	4.1	1. Visits to mangrove and inland water ecosystems. 2. Familiarization of forest products, plants and animal resources. 3. Water Quality Assessment Collect water samples from various sources (e.g., rivers, ponds). Conduct water quality tests (pH, dissolved oxygen, nutrient levels) and assess the ecological implications.	30	2,4,5
5	Teacher specific course components			

Teaching and Learning Approach	<p>Classroom Procedure (Mode of transaction)</p> <p>Field based collection and interactions, Interactive lectures, flipped classroom, Lecture-based Learning, Project-Based Learning, Experiential Learning, Peer Teaching, invited lecture, group discussions, Discussion-based Learning, Inquiry-Based Learning, Online Learning, Blended Learning, and other innovative learning approaches.</p>
Assessment Types	<p>MODE OF ASSESSMENT</p> <p>A. Continuous Comprehensive Assessment (CCA) Theory: 25 marks</p> <ul style="list-style-type: none"> ·Involvement and responses in class room transactions ·Home Assignments/preparedness ·Oral presentation/Viva/Quiz/Open book test/written test <p>Field study report /Group discussion on a recent research or review article (≤ 5 years) related the course</p> <ul style="list-style-type: none"> ·Any other method as may be required for specific course / student by the course faculty <p>Practical: 15 marks</p> <ul style="list-style-type: none"> ·Lab involvement and practical skills ·Record/Any other method as may be required for specific course / student by the course faculty

	<p>B. End Semester Evaluation (ESE)</p> <p>Theory: 50 marks</p> <p>Short answer (10 out of 12): 10 x 1=10</p> <p>Short Essay (6 out of 8) : 6 x 5= 30</p> <p>Essay (1 out of 2) : 1x 10= 10</p> <p>Practical: 35 marks</p> <p>·Practical based assessments: 30 marks</p> <p>·Record: 5 marks</p>
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REFERENCES

1. Anil Tyagi (2007). Environmental Science, Danika publishing company, New Delhi.
2. Arya, A.S (1997). Key note Address, Seminar on “Built Environment & Natural hazards”. Indian buildings congress. February, New Delhi.
3. Barrington EJW, Environmental Biology. Resource and Environmental Science series, Edward Arnold (pub) Ltd. London.
4. Daniel D, Chiras and John P. Reganold, (2009). Natural Resource Conservation: Management for a Sustainable Future.
5. Fred Van Dyke, Conservation Biology: Foundations, Concepts, Applications Third Edition.

SUGGESTED READINGS

1. Khitoliya R.K & K. Venkatachalam (1997). Urban settlements and Natural hazards. Proceedings of seminar on Natural hazards in the Urban habitat. November, New Delhi.
2. Martha J. Groom, Gary K. Meffe, and C. Ronald Carroll; Principles of Conservation Biology.
3. Peter Kareiva, Michelle Marvier, and Brian Silliman; Conservation Science: Balancing the Needs of People and Nature
4. Purohit, S.S, Shammi, Q. Land Agarwal, A.K (2004). A text book of Environmental science, student edition publishers, Jodhpur.
5. Rachel M. Fewster and J. Bastow Wilson, The Ecology of Natural Resources.



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Programme						
Course Name	Environmental pollution and management					
Type of Course	DSC C					
Course Code	MG4DSCEVS200					
Course Level	200					
Course Summary	The course aims to equip students with the knowledge and skills necessary to understand, assess, manage, and mitigate environmental pollution while considering sustainable and socially responsible practices.					
Semester	IV	Credits			4	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	1	-	75
Pre-requisites, if any						

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COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand the definition, structure and constituents; sources and nature of air pollutants. Distinguish between the various types of air pollutants. Examine the effects of air pollution on - Human being - Animals - Plants - Materials, buildings and climate. Discuss the control various measures of Air pollution.	U, A, An	PO1, PO2, PO3, PO10
2	Understand the definition, Types and sources of water pollution. Examine and discuss the effects and various measures to control water pollution.	U, A, An	PO1, PO2, PO3, PO10
3	Understand the definition, Types and sources of soil pollution. Examine and discuss the effects and various measures to control soil pollution.	U, A, An	PO1, PO2, PO3, PO10
4	Understand the definition of noise pollution. Examine and discuss the effects of noise pollution, control and protective measures.	U, A, An	PO1, PO2, PO3, PO10
5	Understand the definition, Types and sources of Radioactivity. Examine and discuss the effects of Radioactive pollution, precautions and control measures.	U, A, An	PO1, PO2, PO3, PO10
*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

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COURSE CONTENT

Module	Units	Course description	Hours	CO No.
Air pollution - Sources, effects and control measures (13hours)				
1	1.1	Air pollution - Sources, effects and control measures Definition - Structure and constituents; sources, nature and types of pollutants - primary and secondary air pollutant, particulate matter, aerosols, fly ash, biopollutants.	8	CO1
	1.2	Effects of air pollution on - Human being - Animals - Plants - Materials, buildings and climate. Control measures of Air pollution.	5	CO1
Water and Soil / Land pollution - Sources, effects and control measures (20 hours)				
2	2.1	Definition, Types of water pollution - Point and non point source of water pollution- surface and ground water pollution.	4	CO2
	2.2	Sources of water pollution - Domestic, Industrial, Agricultural and Natural sources.	4	CO2
	2.3	Effects of water pollution on human being, animals, plants and environment. Control measures of water pollution.	4	CO2
	2.4	Sources, nature and types of soil pollutants - fertilizer residues, solid wastes, radioactive substances, hospital wastes, pesticides, field run off and sewage effluents.	6	CO3
	2.5	Control measures of soil pollution.	2	CO3
Noise pollution and Radioactive pollution - definition, effects and control measures (12 hours)				
3	3.1	Definition, general effects of noise pollution.	2	CO4
	3.2	Control and protective measures of noise pollution.	4	CO4
	3.3	Definition, Types and sources of Radioactivity.	2	CO5
	3.4	Effects of Radioactive pollution, precautions and control measures.	4	CO5

	Practical (30 hours)			
4	4.1	Collection and analysis of water samples from various sources (rivers, lakes, groundwater) - Assessment of physical, chemical, and biological parameters - Understanding the impact of pollutants on aquatic ecosystems Soil analysis - Determination of pH, acidity, total organic content, potassium and calcium. - Familiarize the equipment's used in soil analysis. - Determination of soil texture - triangular diagram	30	CO1 CO2 CO3
5	Teacher specific content			

Teaching and Learning Approach	Classroom Procedure (Mode of transaction) Field based collection and interactions, Interactive lectures, flipped classroom, Lecture-based Learning, Project-Based Learning, Experiential Learning, Peer Teaching, invited lecture, group discussions, Discussion-based Learning, Inquiry-Based Learning, Online Learning, Blended Learning, and other innovative learning approaches.
Assessment Types	MODE OF ASSESSMENT A. Continuous Comprehensive Assessment (CCA) Theory: 25 marks <ul style="list-style-type: none"> · Involvement and responses in class room transactions · Home Assignments/preparedness · Oral presentation/Viva/Quiz/Open book test/written test Field study report /Group discussion on a recent research or review article (≤ 5 years) related the course <ul style="list-style-type: none"> · Any other method as may be required for specific course / student by the course faculty Practical: 15 marks <ul style="list-style-type: none"> · Lab involvement and practical skills · Record/Any other method as may be required for specific course / student by the course faculty

	<p>B. End Semester Evaluation (ESE)</p> <p>Theory: 50 marks</p> <p>Short answer (10 out of 12): 10 x 1=10</p> <p>Short Essay (6 out of 8) : 6 x 5= 30</p> <p>Essay (1 out of 2) : 1x 10= 10</p> <p>Practical: 35 marks</p> <p>Practical based assessments: 30 marks</p> <p>Record: 5 marks</p>
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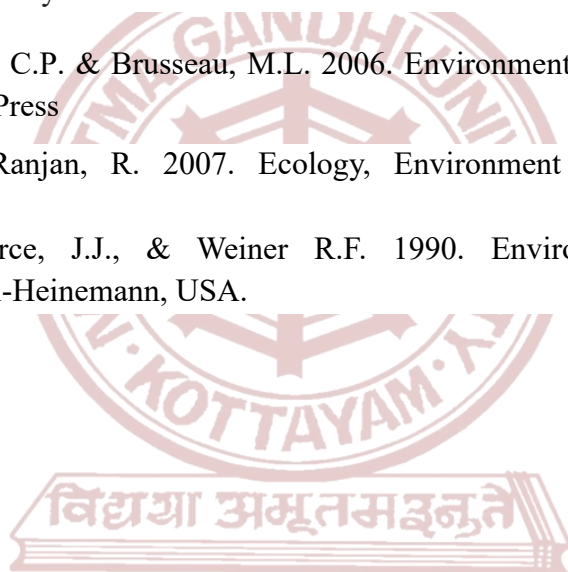


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References

1. J. Jeffrey Peirce, Ruth F. Weiner, and P. Aarne Vesilind;1998, Environmental Pollution and Control 4th Edition.
2. James E. Girard; 2009. 2nd Edition, Principles of Environmental Chemistry, Jones and Bartlett publishers, Inc.
3. Tim O'Riordan and Susanne Stoll-Kleeman; 2006. Environmental Management: Principles and Practice.
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	<h1>Mahatma Gandhi University</h1> <h2>Kottayam</h2>					
Programme						
Course Name	Environmental legislation and management					
Type of Course	DSE					
Course Code	MG7DSEEVS400					
Course Level	400					
Course Summary	<p>This course enables students attain the acquired ability to impart knowledge to local public as a means to preserve environment and resources at grass root level. Helps study the principles and tools evolved for development on sustainable basis. Get an idea on aspects of disaster management and its effect on development. Understand the role of various international & national organizations that help in preserving our environment & resources.</p>					
Semester	7	Credits			4	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
Pre-requisites, if any						

COURSE OUTCOMES (CO)

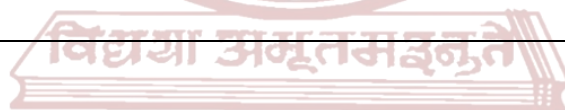
CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand the principles of environmental laws and acts in India.	U	PO3, PO 6
2	Discuss the Environmental conventions and summits associated with environmental protection.	U	PO3, PO6, PO7, PO10
3	Understand the various international & national organizations on environment	U, A	PO3, PO6 PO7, PO10
4	Study the principles and tools evolved for development on sustainable basis.	U, A	PO3, PO6 PO7, PO10
5	Analyze the aspects of disaster management and its effect on development.	An	PO2, PO3 PO6, PO7, PO10
*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT

Module	Units	Course description	Hours	CO No.
Environmental legislation and Environmental conventions and summits (16 hours)				
1	1.1	Fundamental principles of environmental laws, General structure of environmental laws in India and constitutional responsibilities, The Water (Prevention and Control of Pollution) Act 1974, The Air (Prevention and Control of Pollution) Act 1981, The environment (Protection) act 1986, wild life protection act 1972, Forest Conservation Act 1980. Laws for the waste disposal – solid waste and hazardous waste, biomedical waste.	10	CO1
	1.2	Stockholm Convention 1972, Montreal Protocol 1987, Ramsar Convention, Rio declaration 1992 and Agenda 21, Earth Summit, Kyoto Protocol.	6	CO2
National and international organizations on environment (14 hours)				

2	2.1	UNEP, UNDP, WWF, IUCN, Earth watch, Green Peace.	7	CO 3
	2.2	Information networks - ENVIS centres, National bureau for plant genetic resources (NBPGR), conservation of gene reserve, global environmental management, non-conventional energy use.	7	CO3
Tools in sustainable development (15 hours)				
3	3.1	Principles and tools in sustainable development; careful identification of the causes and consequences (short term and long term) of a broad range of problems in developing and industrial countries.	4	CO 4
	3.2	Environmental impact assessment, environmental auditing, remote sensing, geographic information systems, biofarming, environmental planning. Activity 1 Illustrate the steps involved in management of organic waste / control of soil pollution.	11	CO 4
Disaster management and Development (15 hours)				
4	4.1	Characterization of natural disasters and its management - earthquake, draught, flood and landslide. Activity -1 Study of different types of disasters and enumerate its environmental effects. Activity -2 Conduct a survey to analyze the impacts in a disaster-affected area.	15	CO5
5	Teacher specific content			

Teaching and Learning Approach	<p>Classroom Procedure (Mode of transaction)</p> <p>Field based collection and interactions, Interactive lectures, flipped classroom, Lecture-based Learning, Project-Based Learning, Experiential Learning, Peer Teaching, invited lecture, Discussion-based Learning, Inquiry-Based Learning, Online Learning, Blended Learning, and other innovative learning approaches.</p>
Assessment Types	<p>MODE OF ASSESSMENT</p> <p>A. Continuous Comprehensive Assessment (CCA) Theory/Hands on Work- 30 Marks</p> <ul style="list-style-type: none"> ● Involvement and responses in class room transactions ● Home Assignments ● Oral presentation/ Viva/Quiz/Open book test ● Field study, Group discussion on a recent research or review article(<5 years) related to the course ● Any other method as may be required for specific course / student by the course faculty <hr/> <p>B. End Semester Evaluation (ESE)- 70 marks</p> <ul style="list-style-type: none"> ● Very Short Answer (10 out of 12) : 2 x 10=20 Marks ● Short Answer (8 out of 10) : 8 x 5= 40 Marks ● Essay (1 out of 2): 1x 10= 10marks



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Syllabus

References

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Syllabus

	Mahatma Gandhi University Kottayam					
Programme						
Course Name	Environmental conservation and management					
Type of Course	DSE					
Course Code	MG7DSEEVS401					
Course Level	400					
Course Summary	This course enables students to study various aspects of ecotourism. Evaluate the importance of environmental education in preserving our resources. Understand the different aspects of habitat management.					
Semester	VII	Credits			4	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		4	-	-	-	60
Pre-requisites, if any	NIL					

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COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand the different aspects of habitat management. Discuss on conservation, threats/depletion of biodiversity. Distinguish between various conservation strategies at International and National level.	U, A	3, 6, 7
2	Discuss on effective land use management for sustainable development.	U, A	3, 6, 7, 10
3	Analyze the socio-economic factors involved in managing water resources. Distinguish between conventional and non-conventional sources of water supply management.	A, An	3, 6, 7, 10

4	Study various aspects of ecotourism. Analyze nature-based ecotourism opportunities in Kerala; strategies to maintain them in an ecological sustainable way.	An	3, 6, 7, 10
5	Evaluate the importance of environmental education in preserving our resources.	E	2, 3, 6, 7, 10
*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT

Module	Units	Course description	Hrs	CO No.
1	Habitat management (15 hours)			
	1.1	Conservation of forests, wild life, air, water, soil and environments.	3	1
	1.2	Threats/depletion of biodiversity, conservation of biodiversity - ex-situ and in-situ; national parks, wildlife sanctuaries, biosphere reserves, sacred groves.	4	1
	1.3	International conservation strategies - CBD, CITES, global biodiversity strategy, GEF Initiatives, national biodiversity action plans, biodiversity registries, biodiversity with special reference to Kerala, cause of extinction of species, endangered species, management of mangrove vegetation.	8	1
2	Land and Water Resources Management (13 hours)			
	2.1	Strategies and planning for soil pollution control, changes in agricultural practices, solid waste management, vermicomposting, bacterial composting. Learning Activity: Familiarize the equipment and the steps involved in estimating soil water content.	7	2
	2.2	Precautions in the use of radioactive substances. Occupational health hazards with relation to solid waste disposal.	2	2
	2.3	Socio-economic factors involved in managing water resources.	2	3


	2.4	Conventional and non-conventional sources of water supply management, rain water harvesting.	2	3
3	Ecotourism (16 hours)			
	3.1	Ecotourism and responsible tourism- From an environmental management perspective rather than tourism as an industry.	4	4
	3.2	Identification of nature-based ecotourism opportunities in Kerala - dam sites, HEP, waterfalls, mangroves, bird sanctuaries, pilgrim tourism, forest area, parks, sacred groves, beaches, wildlife sanctuaries, national parks Learning activity: Visit a conservation area (e.g. National park, wildlife sanctuary). Identification of endangered animal and plant species of Kerala from photographs.	12	4
4	Environmental conservation and Education (16 hours)			
	4.1	Strategies to maintain nature based ecotourist areas in an ecological sustainable way. Coastal management activities in India and Kerala. Learning activity: Field visit to an ecotourism site, observe and analyse the sustainable practices and submit a report	10	4
	4.2	Environmental education : Education to inculcate environmental consciousness among learners.	3	5
	4.3	Non-formal and formal education (business, union, community and other organizations): methodologies (posters, banners, audio-visual aids, street plays, padayatras, corner meetings).	3	5
5	Teacher specific course components			

Teaching and Learning Approach	Classroom Procedure (Mode of transaction) Field based collection and interactions, Interactive lectures, flipped classroom, Lecture-based Learning, Project-Based Learning, Experiential Learning, Peer Teaching, invited lecture, group discussions, Discussion-based Learning, Inquiry-
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	Based Learning, Online Learning, Blended Learning, and other innovative learning approaches.
Assessment Types	MODE OF ASSESSMENT A. Continuous Comprehensive Assessment (CCA) Theory/Hands on Work- 30 Marks <ul style="list-style-type: none"> ● Involvement and responses in class room transactions ● Home Assignments ● Oral presentation/ Viva/Quiz/Open book test ● Field study, Group discussion on a recent research or review article(<5 years) related to the course ● Any other method as may be required for specific course / student by the course faculty
	B. End Semester Evaluation (ESE)- 70 marks <ul style="list-style-type: none"> ● Very Short Answer (10 out of 12) : 2 x 10=20 Marks ● Short Answer (8 out of 10) : 8 x 5= 40 Marks ● Essay (1 out of 2): 1x 10= 10marks

References

1. Nagore, A. P. (1996). Biological diversity and international Environmental law. ABH Publishing Corp. New Delhi.
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		<h1>Mahatma Gandhi University</h1> <h2>Kottayam</h2>				
Programme						
Course Name	Remote sensing, GIS and EIA					
Type of Course	DSE					
Course Code	MG7DSEEVS402					
Course Level	400					
Course Summary	This course enables students to understand the principles, concepts and applications of remote sensing and GIS in environmental studies. Understand the principles, concepts and various steps and methodologies involved in conducting an EIA; EIS, EMP.					
Semester	VII	Credits			4	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		4	-	-	-	60
Pre-requisites, if any						

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COURSE OUTCOMES (CO) *Syllabus*

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand the definition, principle, concept and scope of remote sensing.	U	PO1 PO 3
2	Relate the components of Remote Sensing techniques.	U	PO1 PO 3
3	Understand the basic concepts, characteristics, components and applications of GIS. Distinguish between different data structures in GIS.	U	PO1 PO 3

4	Understand the basic concepts, nature and scope of cartography. Distinguish between different types of maps, elements and components of a map.	U	PO1 PO 2 PO 3
5	Relate the various applications of Remote Sensing and GIS with special reference to conservation and management.	U, A	PO1 PO2 PO3 PO6
6	Understand the definition, aim, principles and concept of EIA. Analyze the method and steps involved in EIA. Distinguish between EIS and EMP.	U, A, An	PO1 PO2 PO3 PO6 PO10
*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

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COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course description	Hrs	CO No.
1	Basics of Remote Sensing technology and Components of Remote Sensing techniques (14 hours)			
	1.1	Definition, principle, concept and scope of remote sensing.	6	1
	1.2	Electromagnetic spectrum, platform for Remote sensing techniques, sensors, image resolution - spatial, spectral, temporal, radiometric resolution.	8	2

2	Basic of GIS and mapping concepts (17hours)			
	2.1	Concepts and components. Characteristics of GIS, applications of GIS. Activity-1 Attend a workshop on Remote Sensing and GIS.	6	3
	2.2	Data structures in GIS - Vector data and raster data.	5	3
	2.3	Definition, nature and scope of cartography, small scale maps, large scale maps, types of maps, elements and components of a map.	6	4
3	Applications of Remote Sensing and GIS (12 hours)			
	3.1	Applications with special reference to conservation and management – land use and land cover, management of invasive species, water resource, wildlife, forest, protected area, natural disaster management, monitoring of air and soil quality, vegetation, and climate change. Activity-1 Conduct a case study on successful public consultation processes.	12	5
4	Introduction to EIA (17 hours)			
	4.1	Definition, aim, principles and concept of EIA.	4	6
	4.2	Method and steps; Impact assessment methodologies: i) Adhoc Method, ii) Overlay Method, iii) Checklist Method, iv) Network Method v)Matrix Method.	8	6
	4.3	Environmental Impact Statement (EIS) and Environmental Management Plan (EMP).	5	6
5	Teacher specific content			

Teaching and Learning Approach	<p>Classroom Procedure (Mode of transaction)</p> <p>Field based collection and interactions, Interactive lectures, flipped classroom, Lecture-based Learning, Project-Based Learning, Experiential Learning, Peer Teaching, invited lecture, Discussion-based Learning, Inquiry-Based Learning, Online Learning, Blended Learning, and other innovative learning approaches.</p>
Assessment Types	<p>MODE OF ASSESSMENT</p> <p>A. Continuous Comprehensive Assessment (CCA) Theory/Hands on Work- 30 Marks</p> <ul style="list-style-type: none"> ● Involvement and responses in class room transactions ● Home Assignments ● Oral presentation/ Viva/Quiz/Open book test ● Field study, Group discussion on a recent research or review article(<5 years) related to the course ● Any other method as may be required for specific course / student by the course faculty <hr/> <p>B. End Semester Evaluation (ESE)- 70 marks</p> <ul style="list-style-type: none"> ● Very Short Answer (10 out of 12) : 2 x 10=20 Marks ● Short Answer (8 out of 10) : 8 x 5= 40 Marks ● Essay (1 out of 2): 1x 10= 10marks

References

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2. Rathore, V. S. (2017). Fundamentals of Remote Sensing and GIS. New Delhi, India: Oxford University Press.
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