

Anekant Education Society's
TULJARAM CHATURCHAND COLLEGE OF ARTS, SCIENCE & COMMERCE,
BARAMATI.
AUTONOMOUS

Scheme of Course Structure (Faculty of Science)
Department: Environmental Science (2019- 2020)

Class	Semester	Paper Code	Title of Paper	No. of Credits
F.Y.B.Sc.	I	EVS1101	Fundamentals of Environmental Science - I	2
		EVS1101	Fundamentals of Environmental Biology - I	2
		EVS 1103	Practical based on EVS1101 & EVS1102	2
	II	EVS 1201	Fundamentals of Environmental Science - II	2
		EVS 1202	Fundamentals of Environmental Biology - II	2
		EVS 1203	Practical based on EVS1201 & EVS1202	2
S.Y.B.Sc	III	EVS 2301	Natural Resources, Energy and their management	
		EVS2302	Environmental pollution and control – I	
		EVS 2303		
	IV	EVS 2401	Solid and Hazardous Waste Management	
		EVS 2402	Environmental pollution and control – II	
		EVS 2403		
T.Y.B.Sc	V	EVS3501		
		EVS3502		
		EVS3503		
		EVS3504		
		EVS3505		
		EVS3506		
		EVS3507		
		EVS3508		
		EVS3509		
	VI	EVS3601		
		EVS3602		
		EVS3603		
		EVS3604		
		EVS3605		
		EVS3606		

		EVS3607		
		EVS3608		
		EVS3609		

SYLLABUS

FIRST YEAR B.Sc. ENVIRONMENTAL SCIENCE

ACADEMIC YEAR 2019-2020

SEMESTER - I

DEPARTMENT OF ENVIRONMENTAL SCIENCE

A. Learning objectives:

- To learn basic characteristics of environment.
- To learn about interrelationship and discipline in environment science
- To make the students aware about conservation and sustainable use of Biodiversity.
- To emphasize on the bioresources.

B. Learning outcomes :

- Imparts conceptual knowledge of environment, their adaptations and interrelationship.
- To understand the distinguishing characters of ecological adaptations.
- Study of biodiversity and apply that knowledge in day to day life.
- Students acquire knowledge about bioresources.
- Contributes the knowledge for conservation and sustainable use of Biodiversity.

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PAPER CODE: EVS 1101

PAPER - I: FUNDAMENTALS OF ENVIRONMENTAL SCIENCE - I

Credit -2: No. of Lectures 36.

Credit - 1

Unit I : Introduction :

Definition, Principles and Scope of Environmental Science.

Interrelationship of ecology with other disciplines. Ecology and its types: Behavioral ecology, Population ecology, Community ecology, Landscape ecology.06

Unit II : Biosphere and its components :

Definition of Biosphere; Components of biosphere.

Unit III : Atmosphere:

Definition, Composition of air; Physico-chemical structure of atmosphere: Troposphere, Stratosphere, Mesosphere, Ionosphere, Exosphere. 10

Credit - 2

Unit IV :

Lithosphere: Definition; Types of rocks; Process of soil formation: Physical weathering, Chemical weathering; Soil profile; Physical properties of soil : Density, Porosity, Permeability, Temperature, Soil water, Soil atmosphere;

Chemical properties of soil : Hydrogen ion concentration, Organic matter, Inorganic elements; Soil fauna and Soil flora; Soil erosion: Agents of soil erosion: Running water, Glaciers, Wind, Sea water, Deforestation and Overgrazing; Types of erosion: Sheet erosion, Rill erosion, Gully erosion, Slip erosion (land slide), Wind erosion; methods of Soil conservation.....10

Unit V :

Hydrosphere: Definition, Physical properties of water : Temperature, Specific gravity, Viscosity, Thermal

conductivity, Expansion before freezing, Surface tension, Solvency, Buoyancy, Transparency, Pressure; Chemical properties of water : Salinity, Solubility of gases, Oxygen, Carbon dioxide, Nitrogen, Hydrogenion concentration, Hydrogen Sulphide; Hydrological cycle.10

References

01. Fundamentals of Ecology :Eugene P. Odum, (Natraj Publishers, Dehradun.)

02. Principles of Ecology :P. S. Verma, V. K. Agarwal (S. Chand and Co. New Delhi)

03. Environmental Biology :P. D. sharma (Rastogi Publications, Meerut)

04. Ecology and Environment :P. D. sharma (Rastogi Publications, Meerut)

- 05. Principles of Environmental Biology** :P. K. G. Nair (Himalaya Publishing House, New Delhi)
- 06. Environmental Biology** :M. P. Arora (Himalaya Publishing House, New Delhi)
- 07. Environmental Science** :Enger Smith, Smith, W. M. C. Brown (Company Publishing)
- 08. Principles of Soil Science** :Watt K. E. F. (1973), (McGraw Hill Book Company, New Delhi)
- 09. Introduction to Environmental Studies** :Turk & Turk
- 10. Ecology and Field Biology** :Robert Leo Smith (Harper Collins college publication)
- 11. General Ecology** :H. D. Kumar (Vikas Publishing house, New Delhi)
- 12. Elements of Ecology** :Brijgopal, N. Bharadwaj (Vikas Publishing house, New Delhi)
- 13. Fundamentals of Environmental Science** :G. S. Dahliwal, G. S. Sangha, P. K. ralhan (Kalyani Publishers, New Delhi)
- 14. Environmental Ecology** :Bill Freedman (Academic Press, New York)
- 15. Concepts of Ecology** :N. Arumugam (Saras Publication, Kottar, Dist. Kanyakumari)
- 16. Plant Ecology** :P. L. Kochhar

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PAPER CODE: EVS 1102

PAPER - I: FUNDAMENTALS OF ENVIRONMENTAL BIOLOGY - I

Credit -2: No. of Lectures 36.

Credit -1

Unit I: Introduction to Biology :

Introduction to Biology, Branches, Scope and Importance in today's context from environmental point of view. Charles Darwin's Voyage of HMS Beagle – His theory of 'Survival of the Fittest'. Biological diversity of India – Major genera, species, sub-species of flora and fauna. Major ecological types of India.....06

Unit II: Origin of Life :

What is Life? The origin of Life; Evolution of Life through the geological time i.e. Eras, Periods, Epochs; Events of (Evolutionary) 'Explosions' and 'Mass Extinctions' & paleontological Evidences for these. The current 'Mass Extinction' with reference to rate of extinction, factors responsible and possible remedies.....06

Unit III: Biogeography : A glimpse of the present day distribution of Life on Earth; The factors responsible –

- (i) Geological - Continental Drift- Barriers and Bridges,
- (ii) Climatic - Barriers and Bridges,
- (iii) Evolutionary - Speciation etc.
- (iv) Biogeography – The meaning; Biographical profile of the world and India;
- (v) The physical, microbial, floral and faunal characteristics of each Biogeographical zone.06

Credit -2

Unit IV: Ecology and Bioresources :

Ecological Adaptations under various environmental conditions –

- i) In plants - hydrophytes, mesophytes, epiphytes, xerophytes & halophytes
- ii) In animals - mimicry, vestigiality etc.
- iii) Bio-resources Forests- major types of the world & India
- iv) Agricultural crops - major food plants of the world & India

- v) Livestock – major varieties of the world & India
- vi) Fisheries resources - saline & fresh water
- vii) Significances / use of the Bioresources; Extraction of Bioresources by traditional & modern methods; Threat to local bioresources - overexploitation, habitat loss, invasive species etc.....

Unit - V: Productivity and its conservation:

- Concept, types
- Importance of diversity
- Mega biodiversity centres & biodiversity hot spots.
- Status of biodiversity in India & Maharashtra.
- Threats of biodiversity
- Concept of threatened, vulnerable and rare species.
- Measures of conservation: In situ and ex-situ conservation of biodiversity. ..06

Books:

1. Ambashta R.S. & Ambashta N.K (1999) 'A Textbook of Plant Ecology' CBS Publ. & Distributers, New Delhi
2. Chapman J.L. & Reiss M.J. (1995) 'Ecology: Principles and Applications' Cambridge University Press
3. Cunningham W.P. & Saigo S.W. (1997) 'Environmental Science: A Global Concern' WCB, McGraw Hill
4. Sharma P.D. 'Elements of Ecology'
5. Tyler M.G. Jr. (1997) 'Environmental Science' Wadsworth Publ. Co
6. Vashista P.C. 'Textbook of Plant Ecology'
7. Smith R.L. 'Ecology and Field Biology'
8. Benny Joseph (2005) 'Environmental Studies' Tata McGraw Hill Publ. Co. Ltd.
9. 'Patterns in the Living World' – Biology-an Environmental approach, John Murray, London
10. 'Diversity Among Living Things' Biology-an Environmental approach, John Murray, London
11. Bell P.R. & Woodcock Christopher (1973) 'The Diversity of Green Plants' Edward Arnold Ltd.
12. Wilson N. Stewart (1983) 'Paleobotany and the Evolution of Plants' Cambridge University Press

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SYLLABUS

FIRST YEAR B.Sc. ENVIRONMENTAL SCIENCE

ACADEMIC YEAR (2019-2020)

SEMESTER -I I

DEPARTMENT OF ENVIRONMENTAL SCIENCE

PAPER CODE : EVS 1201

PAPER - I: FUNDAMENTALS OF ENVIRONMENTAL SCIENCE - II

Credit -2: No. of Lectures -36.

Credit -1

Unit I : Biogeochemical cycles :

Biogeochemical cycles : a) Gaseous cycles: Oxygen cycle, Carbon cycle and Nitrogen cycle. b) Sedimentary cycles: Phosphorus cycle and Sulphur cycle.08

Unit II : Energy

Laws of thermodynamics, heat transfer processes, mass and energy transfer across various interfaces.....08

Credit -2

Unit III : Metrology

Meteorological parameters – Pressure, temperature, precipitation, humidity, mixing ratio, saturation mixing ratio, radiation and wind velocity, adiabatic lapse rate, environmental lapse rate. Wind roses.....10

Unit IV : GIS: Principles of remote sensing and GIS. Digital image processing and ground truthing. Application of remote sensing and GIS in land cover/land use planning and management (urban sprawling, vegetation study, forestry, natural resource).....10

Unit:-V : Society, Government and Environment:

Concept of sustainable development and the bearing capacity of resources.

Problems of development.-Migration and unbalancing (Villages Vs. Cities), Rehabilitation of displaced communities.Environmental ethics: Issues and possible solutions.

Environment protection Act. Air (Prevention and control of pollution) Act.

Water (Prevention and control of pollution) Act. Wild life protection Act.

Forest conservation and Biodiversity protection Act. Public awareness and human rights.

Global Earth summits.

PAPER CODE: EVS 1202

PAPER - I: FUNDAMENTALS OF ENVIRONMENTAL BIOLOGY – II

Credit -2: No. of Lectures 36.

Credit -1

Unit I : Population ecology: Characteristics of population, concept of carrying capacity, population growth and regulations. Population fluctuations, dispersion and metapopulation. Concept of ‘r’ and ‘k’ species. Keystone species.....07

Unit II: Community ecology: Definition, community concept, types and interaction – predation, herbivory, parasitism and allelopathy. Biological invasions.....07

Unit III: Ecosystem Structure and functions: Structures – Biotic and Abiotic components. Functions – Energy flow in ecosystems, energy flow models, food chains and food webs. Biogeochemical cycles, Ecological succession. Species diversity, Concept of ecotone, edge effects, ecological habitats and niche. Ecosystem stability and factors affecting stability. Ecosystem services.....08

Credit -2

Unit IV: Basis of Ecosystem classification. Types of Ecosystem: Desert (hot and cold), forest, rangeland, wetlands, lotic, lentic, estuarine (mangrove), Oceanic.....07

Unit V: Biomes: Concept, classification and distribution. Characteristics of different biomes: Tundra, Taiga, Grassland, Deciduous forest biome, Highland Icy Alpine Biome, Chaparral, Savanna, Tropical Rainforest.....07

PAPER CODE: EVS 1103

PAPER - III: PRACTICAL BASED ON EVS 1101 EVS 1102

Semester -I

1. Measurement of Atmospheric Humidity by Psychrometer and light by Lux meter.
2. Determination of Soil pH and total organic matter by ignition method.
3. Determination of water holding capacity and soil properties(temperature, texture and particle size).
4. Estimation of Alkalinity and acidity of provided water samples.
5. Estimation of dissolved oxygen from water by Winkler's method.
6. Estimation of carbon dioxide from water by Winkler's method.
7. GIS mapping.
8. Preparation of media for microbial culture
9. Isolation and culture of microbes from soil / water samples.
10. Study of various plant forms (Specimens).
11. Study of vegetation by quadrat method.
12. Visit of any community and submission of Excursion report is compulsory at the time of practical examination

PAPER CODE: EVS 1103

PAPER - III: PRACTICAL BASED ON EVS1102

Semester –II

1. Study of Microscopy
2. Study of Plant Adaptations under various environmental conditions –Hydrophytes.
3. Study of Plant Adaptations under various environmental conditions –Mesophytes.
4. Study of Plant Adaptations under various environmental conditions -Epiphytes and halophytes.
5. Study of Plant Adaptations under various environmental conditions- Xerophytes).
6. Estimation of Nitrates from given soil sample by spectrophotometrically.
7. Estimation of Phosphorus from given sample by spectrophotometrically.
8. Estimation of Na and K from given soil samples by flame photometrically.
9. Estimation of Ca and Mg from given soil sample by titrimetric method.
10. Estimation of Chlorides from given soil sample by silver nitrate method.
11. Isolation and culture of microbes from soil / water samples. 1
12. Visit of Forest / water Reserve and submission of Excursion report is compulsory at the time of practical examination.