

University of Pune
F.Y.B.Sc. (Environmental Science)
Course Design

Paper	Term	Course Number	Course Title	Marks Distribution	Total Marks
I	I	ENV-101	Life Sciences: Basic Biology	50 (10 + 40)	100
	II	ENV-101	Life Sciences: Natural Resources	50 (10 + 40)	
II	I	ENV-102	Earth Sciences: Environmental Chemistry	50 (10 + 40)	100
	II	ENV-102	Earth Sciences: Basic Geosciences	50 (10 + 40)	
III	I & II	ENV-103	Practical based on ENV-101 & ENV-102	100 (20 + 80)	100

F.Y.B.Sc. (Environmental Science)
Syllabus

Paper-I: ENV-101: Life Sciences
(Basic Biology and Natural Resources)

Term-I: ENV-101: Life Sciences: Basic Biology

Description	Lectures
Introduction to biology, branches, scope and importance from environmental point of view. What is life?	3
The evolution of life on earth: Origin of life - Microbes, Plants and Animals, fossils and sediments, distribution and pattern of life in past, Paleontological evidences, Mass extinction,	6
Life forms on Earth (all forms of plants and animals), Life in Water, Life on Land, Microbial life in air, water and soils, microbes and diseases, decomposing soil microbes, marine biology	7
Taxonomic principles: History, aims, objectives, hierarchy and kingdoms, identification and nomenclature.	4
Classification of plants and animals based on form-relationship, species concept, organization of living things, microbial classification, Ecological Classification Systems, Collection and Herbarium, Preservation, flora, fauna, preservation of insects	6
Ecological adaptation under various environmental conditions, Hydrophytes, Xerophytes, Halophytes, Mesophytes, Epiphytes	6
Distribution of life on earth and factors responsible for present day distribution. Continental drift,	4

**Paper-I: ENV-101: Life Sciences
(Basic Biology and Natural Resources)**

Term-II: ENV-101: Life Sciences: Natural Resources

Description	Lectures
Introduction, scope and importance of natural resources, biotic and abiotic resources	3
Renewable and non-renewable natural resources and their limitations	2
Renewable resources: Forest and wildlife resources, forest wealth of India, animal resources, livestock and fisheries	5
Food Resources: World food problems, agricultural resources, agricultural potential of India, effects of modern agriculture	5
Non-renewable resources: Fossil fuels – coal, oil and natural gas, Consequences of rapid consumption of fossil fuels.	4
Fresh and marine Water resources: global distribution of fresh water and its limits, The sources of fresh water for terrestrial life, fresh water resources of India, mans water requirement, floods and droughts.	5
Soil and Mineral resources: global status, mineral resources of India, metals and minerals.	4
Energy resources: Global energy consumption, energy needs, conventional and non-conventional energy sources, alternative energy sources, energy resources of India	6
Mans interactions with natural resources.	2

Books:

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

Paper-II: ENV-102: Earth Sciences
(Environmental Chemistry and Basic Geosciences)

Term-I: ENV-102: Earth Sciences: Environmental Chemistry

Sr.No.	Description	Lectures (36)
1.	Chemistry of atmosphere, Chemical reactions involved in atmosphere, chemistry in ozone depletion, chemical reactions of global warming,	3
2.	Chemistry of water, unusual physical properties, changes in water properties by addition of solute, hydrogen bonding, gases present in water, basic reversible and irreversible reactions in water, sources of cations and anions in water, changes in water properties by addition of solute.	7
3.	Stichiometry, Gibb's energy, chemical potential, chemical equilibria, acid-base reactions, solubility product, carbonate system.	3
4.	Chemistry of carcinogenic compounds and their effects on human body	3
5.	Surfactants: Cationic, anionic and non-ionic detergents, modified detergents.	4
6.	Pesticides: Classification, degradation, analysis, pollution due to pesticides and DDT problems.	4
7.	Lead and its compounds: Physical and chemical Properties, behaviour, human exposure, absorption, influence. Mercury and its compounds: Physical and chemical Properties, behaviour, human exposure, absorption, influence.	6
8.	Hydrocarbons: Chemistry of hydrocarbon decay, environmental effects, effects on macro and microorganism.	3
9.	Destruction of some hazardous substances: acid halide, anhydrides, cyanides and cyanogens bromides, chromium, aflotoxins, halogenated compounds.	3

Books:

A.K. De 'Environmental Chemistry'

H.V. Jadhav 'Elements of Environmental Chemistry.'

S.K. Banerjee 'Environmental Chemistry'

G. Lunn and E. B. Sansone 'Destruction of hazards chemical in the laboratory'

S. S. Dara 'A text book of Environmental Chemistry and Pollution Control'

Paper-II: ENV-102: Earth Sciences
(Environmental Chemistry and Basic Geosciences)

Term-II: ENV-102: Earth Sciences: Basic Geosciences

Sr.No.	Description	Lectures (36)
1.	Atmosphere: Evolution, structure and chemical composition of atmosphere.	6
2.	Temperature measurement and controls, Environmental lapse rate, dry and wet adiabatic lapse rate, inversion of temperature and atmospheric stability.	6
3.	Atmospheric pressure and winds, factors affecting on wind, Forms of condensation, precipitation, hydrological cycle.	6
4.	Internal structure of earth, Geological evolution, plate tectonic, formation of lithosphere. Continental and oceanic crust formation.	6
5.	Types of rocks, Rock cycle, basic minerals of rock, clay minerals, mineral chemistry,	4
6.	Soil and its formation, weathering processes, soil profiles, physical and chemical properties of soil, composition of soil. Macro and micro plant nutrients in soil, Soil classification, Soils of India.	8

Valdiya K.S. 1987, Environmental Geology.

Keller E.A. Environmental Geology

D.S. Lal 'Essentials of Climatology'

T.D. Biswas and S, K. Mukharjee 'A text book of soil science'

ENV-103: Practical based on ENV-101 and ENV-102

Sr. No.	Life Science	Practicals
1	Preparation of media for microbial culture	1
2	Isolation and culture of microbes from soil / water samples.	1
3	Study of various plant forms (Specimens).	1
4	Study of various animal forms (Specimens).	1
5	Study of plant fossil forms from different geological periods.	1
6	Study of plant and animal diseases.	1
7	Preparation of herbarium (demonstration).	1
8	Study of adaptations under various environmental conditions – Hydrophytes and Halophytes	1
9	Study of adaptations under various environmental conditions – Xerophytes and Epiphytes	1
10	Microscopy	1
11	Study of collection and preservation of insects (demonstration)	1

Teachers are requested to include any 12 practicals out of 20 practicals. For First year (6 practicals for first term and 6 practicals for second term)

Sr. No.	Earth science: Environmental Chemistry	Practicals (9)
1.	Collection of river/ dug well/ bore well by random sampling method. Preservation of water samples and validity of water sample for chemical analyses.	1
2.	Estimation of pH, E.C., T.D.S., from given water sample.	1
3.	Estimation of alkalinity from given water sample.	1
4.	Estimation of Hardness, Ca and Mg from given water sample.	1
5.	Estimation of Chlorides by Silver nitrate method.	1
6.	Estimation of Na and K from given water sample by flame photometrically.	2
7.	Estimation of Sulphate from given water sample by spectrophotometrically/ colorimetrically.	1
8.	Estimation of Phosphate from given water sample by Spectrophotometrically	1
Sr. No.	Earth science: Basic Geosciences	Practicals (11)
1.	Collection of soil samples from agricultural/ waste land/ riverside soil/ streamside soil.	1
2.	Estimation of pH, E.C., moisture content, organic content of given soil sample.	1
3.	Estimation of Ca and Mg from given soil sample by titrimetric method.	1
4.	Estimation of Chlorides from given soil sample by silver nitrate method.	1
5.	Estimation of Nitrates from given soil sample by spectrophotometrically.	1
6.	Estimation of Phosphorus from given sample by spectrophotometrically.	1
7.	Estimation of Na and K from given soil samples by flame photometrically.	2
8.	Identification of different rock hand specimen for its physical properties.	1
9.	Identification of different mineral specimens for their physical properties.	2

Manivascumm ‘ Analysis of water and waste water’

S.K. Maiti ‘ Handbook of methods in Environmental studies’ Vol. 1 water and wastewater analysis.

R. K. Trivedi ‘Physicochemical analysis of water and soil’

Willard ‘ Instrumental Methods of Analysis’