



SU/BOS/Science/06

Date: 01/01/2024

To,

The Principal,
All Concerned Affiliated Colleges/Institutions
Shivaji University, Kolhapur

The Head/Co-ordinator/Director
All Concerned Department (Science)
Shivaji University, Kolhapur.

Subject: Regarding syllabi of B.Sc. Part-III (Sem. V & VI) as per NEP-2020 (1.0) degree programme under the Faculty of Science and Technology.

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the revised syllabi, nature of question paper and equivalence of B.Sc. Part-III (Sem. V & VI) as per NEP-2020 (1.0) degree programme under the Faculty of Science and Technology.

B.Sc.-III (Sem. V & VI) as per NEP-2020 (1.0)			
1.	Mathematics	12.	Computer Science (Opt)
2.	Statistics	13.	Computer Science (Entire)
3.	Physics	14.	Information Technology (Entire)
4.	Microbiology	15.	Food Science and Technology (Entire)
5.	Industrial Microbiology	16.	Food Science
6.	Electronics	17.	Food Science and Quality Control (Entire)
7.	Chemistry	18.	Food Technology & Management (Entire)
8.	Sugar Technology (Entire)	19.	Biochemistry
9.	Geology	20.	Biotechnology (Optional/Vocational)
10.	Zoology	21.	Biotechnology (Entire)
11.	Botany	22.	Environmental Science (Entire)

This syllabus, nature of question and equivalence shall be implemented from the academic year 2024-2025 onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in NEP-2020(Online Syllabus)

The question papers on the pre-revised syllabi of above-mentioned course will be set for the examinations to be held in October /November 2024 & March/April 2025. These chances are available for repeater students, if any.

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

By Registrar
Dr. S. M. Kubal

Copy to:

SHIVAJI UNIVERSITY, KOLHAPUR.



Accredited By NAAC with 'A++' Grade
Choice based Credit System with Multiple Entry and Multiple Exit Options
Syllabus For

B.Sc. Part - III

Environment Science (Entire)

SEMESTER V AND VI

(Syllabus to be implemented from June, 2024⁻²⁵ onwards)

Ajadhaw



Structure – III

Student contact hours per week: 32 Hours (Min)	Total Marks for B.Sc.-III (Including English): 800
Theory and Practical Lectures: 48 Min. Each	Total Credits for B.Sc.-III (Semester V & VI): 48
DSC : - Discipline Specific Core Course : All papers are compulsory.	
● AECC- Ability Enhancement Compulsory Course (E & F) : English	
Practical Examination will be conducted annually for 200 Marks.	
● There shall be separate passing for theory, internal and practical.	
(A) Non-Credit Self Study Course : Compulsory Civic Courses (CCC)For Sem V: CCC – II : Constitution of India and Local Self Government	
(B) Non-Credit Self Study Course : Skill Development Courses (SDC)For Sem VI: SDC – II: Any one from following (vi) to (x) vi) Interview & Personal Presentation Skill, vii) Entrepreneurship Development Skill, viii) Travel & Tourism, ix) E-Banking & Financial Services, x) RTI & Human Right Education (HRE), IPR & Patents	

Third Year Bachelor of Science Program Structure (NEP-2020 PATTERN)

B. Sc.: Environment Science (Entire): III Academic Year 2024-25

Part 3 (Sem V & VI)

Sr. No.	Sem V	Sr. No.	Sem VI
DSE-E1	Environment management I	DSE- F1	Restoration Ecology I
DSE-E 2	Environment management II	DSE-F2	Restoration Ecology II
DSE-E 3	Environmental education and policy-I	DSE-F3	Environmental toxicology-I
DSE-E 4	Environmental education and policy-II	DSE-F4	Environmental toxicology-II
AECC-E	English III	AECC-F	English IV
SEC- V	Any one from pool of courses (Online & Self-study mode)	SEC -VI	Any one from pool of courses (Online & Self-study mode)

Practical

DSC-P8	Lab Course VIII
DSC -P9	Lab Course IX
DSC -P10	Lab Course X

Semester V
DSE-E1 Environment Management – I
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Course Outcome:

1. To study the concept of water balance and types of irrigation systems.
2. Understand about distribution and use of water and land resources.

Unit	Lecture Hours
Unit I	15
A: Land resources Significance of top most layer Distribution of land resources in India Topography-Concept and importance, Importance of land resources for economy, Types of land resources, land use groups, uses of land resources	8
B: Role of agriculture, horticulture and forestry Agroforestry, social forestry, extension forestry: concept, objectives, benefits, Agriculture and Horticulture- concept, objectives and benefits Regeneration methods, Conservation through improved practices	7
Unit II	15
A: Land degradation Degradation of land-causes and effects, Problems related to waste lands, khar land and wet lands, Desertification: Causes, effects and reclamation measures Soil erosion: causes and effects, types of soil erosion and mitigation measures	8
B: Conservation of land resources: Measures for land management: Integrated pest management, Integrated plant nutrient management, Conservation measures for arable lands: tillage practices, vegetative ridges, mechanical measures, biological measure, vegetative waterways	7

Semester V
DSE-E2 Environment Management – II
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Course Outcome:

1. Understand various anthropogenic reasons responsible for land degradation.
2. To study various watershed management measures.

Unit	Lecture Hours
Unit I	15
A: Water resources Sources: Surface and subsurface sources, occurrence and distribution Conflicts over water in India and world, Water pollution and scarcity: causes and mitigation measures, Uses of water resources Hydrology: concept and scope	8
B: Irrigation practices and water balance: Concept and scope of water balance, Types of irrigation systems- surface and subsurface irrigation, quality of irrigation water, Water logging, salinity: causes, effects and control measures Integrated approach towards water management	7
Unit II	15
A: Conservation of water resources: National water policy, integrated approach towards water management, water management strategies and problems, Mitigation measures for water pollution, Rain water harvesting and groundwater recharge, Traditional methods of water conservation	8
B: Watershed management: Introduction to watershed management, characteristics of watershed: permeability, size, shape, slope, topography, relief Need of watershed planning, rural and integrated watershed development, watershed based farming system, livestock production, energy plants and sericulture	7

References:

1. Cunningham W.P, 1994, Understanding our environment: An introduction, W.C. Brown Publishers, Oxford
2. Khan et. Al, Wasteland Development
3. Dr. Rajvir Singh, Watershed planning and management, 2nd edition, Yash Publishing House, Bikaner, India
4. R.Suresh, Soil and Watershed Conservation engineering, 2nd edition, standard Publication Distributors, Delhi
5. G.O.Schwab, Soil and Water conservation engineering, 4th edition, John Wiley and sons
6. Manual of soil and water conservation practices, ICAR, GOI
7. Bharat Kakade, Watershed Manual, BAIF publications
8. S.S. Negi, Forest Management in India, Published by Bishen Singh Mahendra Pal Singh
9. Madan K. Jha, V.V.N. Murty, Land and Water Management Engineering, 2013

Semester V
DSE-E3 Environmental Education and Policy – I
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Course Outcome:

1. Study the background, need, objectives and status of environmental education.
2. Get acquainted with various environmental laws in India.

Unit	Lecture Hours
Unit I	15
A: Introduction to Environmental Education Definition and background of environmental education, need and objectives of environmental education. Status of environmental education in new education policy – Role of various institutions in protection of environment (Govt. and Non Govt.)	8
B: Introduction to Environmental law: Introduction to environmental law, need for environmental law in India, magna carta on human environment, our common future Indian constitution and 42 nd amendment of 1976, right to constitutional remedies and environment, fundamental duties of citizens for environment, Polluter pays principle, corporate social responsibility	7
Unit II	15
A: Environmental laws The environment (Protection) Act, 1986, The water (prevention and control of pollution) act, 1974 The air (prevention and control of pollution) act, 1981 Public Liability Insurance Act, 1991, Noise Pollution and Law, Sec. 119 and 120 of the Motor Vehicles Act, 1989 and rules framed there under.	8
B: Environmental Pollution and Control under other laws: Provisions of Indian Penal Code, 1860 Provisions under Criminal Procedure Code, 1973 National Environment Tribunal Act, 1995 Coastal Regulation Zone, 2011: objectives and physical limits of zone National Environmental Policy, 2006: objectives, principles and strategies	7

SUGGESTED BOOKS:

1. Bell Stuart, McGillivray, Environmental law, Oxford University Press, New Delhi
2. Singh Gurdeep (2005) Environmental law in India, Macmillan India Ltd, Delhi
3. Shastri S.C. (2015), Environmental Law, Eastern Book Company, Lucknow
4. Divan Shyam, Rosencranz (2013), Environmental Law and policy in India, Oxford University Press, New Delhi
5. Venkat Aruna (2011), Environmental Law and Policy, PHI Learning Pvt. Ltd., New Delhi
6. Chatterjee Benimadhab (2003), Environmental Laws, Deep and Deep Publications Pvt. Ltd., New Delhi
7. Dr. S. R. Mynemi (2016), Environmental Law, Asia Law House, Hyderabad
8. Shastri S. C. (2005), Environmental Law, Eastern Book Company, Lucknow

Semester V
DSE-E3 Environmental Education and Policy – II
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Course Outcome:

1. Understand the causes and effects of various environmental issues.
2. Get acquainted with environmental ethics from Indian perspective.

Unit	Lecture Hours
Unit I	15
A: Introduction to environmental issues: Environmental problems i.e. indoor and workplace: water and sanitation, overcrowding, accident, garbage, disease vectors, hazardous waste Global environmental issues with case studies Development and environmental issues in India	8
B: Urbanization and environmental issues Demographic profile, Population density, Impact of urbanization on environment Denundation of rural population and urbanisation and environmental protection, Role of NGOs in tackling environmental issues, cities and ecological sustainability, city problems within global perspective	7
Unit II	15
A: Environmental ethics Introduction to environmental ethics, concept and history of environmental ethics, relation between environment and people, spirituality and environmental ethics, population and environmental ethics, Challenges to the world environmental ethics Human nature interaction in third world country	8
B: Environmental ethics from Indian perspectives: Significance of Indian traditions for environmental ethics, Women in forest, Indian heritage of conservation ethics, environment protection in Indian culture: cultural evolution, nature worship, tribal tradition, reservation of forest, movements for environmental protection Population control in the light of environmental protection	7

SUGGESTED BOOKS:

1. Sayeed Unisa (2016), Population, health and environment, Rawat publications, Jaipur.
2. S.C.Naik (2005), Society and Environment, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
3. Prakash Chand Kandpal (2018), Environmental Governance in India, Sage Publications, London.
4. Dr. M.N. Madhyastha (2003), Prospects and problems of Environment, Daya Publishing house, Delhi.
5. G. Tyler Miller, Jr. (2007), People and Environment, Cengage learning India Ptd. Ltd., New Delhi.
6. George A. James (1999), Ethical Perspectives on Environmental issues in India, A.P.H. Publishing corporation, New Delhi.
7. Diana Mitlin David Satterthwaite Environmental problems in third world cities, Earthscan publications Ltd., London.

Semester VI
DSE F1-Ecological Restoration-I
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Course Outcome:

1. To study concept and need of eco-restoration.
2. To understand about sustainable use of resources.

Unit	Lecture Hours
Unit I	15
A: Introduction to eco-restoration Concept and scope of eco-restoration, role of restoration ecology, Necessity of eco-restoration, types of restoration, holistic approach in restoration, Physical, chemical and biological restoration, Indigenous knowledge of restoration	8
B: Soil conservation Mining and its impact on soil quality, Rehabilitation of mine soils and salt affected soils Soil conservation: biological reclamation techniques Afforestation, Eco-development and environmental friendly products and technologies,	7
Unit II	15
A: Restoration of aquatic ecosystems: Role of plants and microbes in ecosystem restoration, wastewater treatments using wetlands, restoration of coastal ecosystems National environmental policy Sustainable management of resources, Role of pioneer species in restoration	8
B: Eco-restoration of air and hazard hit areas: Restoration of contaminated air, planting air pollutants absorbing plant, potential of carbon sequestration, planning and designing of green belt, role of local biodiversity conservation management committee for restoration, Eco-restoration of cyclonic hit areas, restoration of earthquake hit areas, volcanoes, landslides and flood affected areas	7

Semester VI
DSE F2-Ecological Restoration-II
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Course Outcome:

1. To study role of government, NGO's and media in eco-restoration.
2. Understand the role of social institutions in eco-restoration.

Unit	Lecture Hours
Unit I	15
A: Strategies of eco-restoration: Long term and short term strategies, Role of government agencies and NGO,s in restoration, Public participation in restoration Approaches for environmental awareness and education Role of women in environmental awareness	8
B: Methods of eco-restoration: Restoration monitoring indicators, components of eco-restoration, seed collection and processes involved in nursey management, selection of plant species, Ecological restoration of degraded ecosystem and wastelands, Bio-scrubbers, control measures for leachate	7
Unit II	15
A: Restoration of natural resources and biodiversity: Restoration of forest lands and range lands, restoration of restoration of wild animals, Role of forest research institute in restoration; gene pool campaign Reintroduction of biota, acceleration of ecological succession, restoration of wetlands by mangroves	8
B: Social institutions for eco-restoration: Self-help groups for women, gram panchayat, watershed development committee Benefits of restoration to local inhabitants, socioeconomic issues related to declaration of wildlife sanctuary, Ecotourism: benefits to local villagers	7

References:

1. Managing cover crops profitably, Handbook series book, Published by Sustainable agricultural research and education programme
2. A whole farm approach to managing pest, sustainable agriculture research and education programme
3. Ecological restoration, A practical approach, Steven I, Apfelbaum applied ecological services
4. Restoration of degraded lands, Singh J.S., Rastogi publications, Meerut
5. Ecology, Environment and resource conservation, Singh J.S., Singh S.P., Anamaya Publishers, New Delhi

Semester VI
DSE F3Environmental Toxicology– I
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Course Outcome:

1. To study types of toxic substances and their effects.
2. To study methods useful for analysis of toxicants.

Unit	Lecture Hours
Unit I	15
A: Introduction to toxicology: Concept and scope, toxic substances, principles of toxicology, Intake of toxic substances: Eye absorption, inhalation, ingestion Responses to toxic substances, duration and frequency of exposure, dose response relation Carcinogens, teratogens, mutagens	8
B: Ecotoxicology and epidemiology: Introduction to ecotoxicology, types of toxic substances, factors affecting effect of toxic substances, Phyto-toxins and animal toxins Introduction to epidemiology, pandemic and endemic diseases, zoonosis	7
Unit II	15
A: Toxic substances: Introduction to toxic substances, source and effects, impact of ecosystem on fate and transport of toxicant and means of transportation, Introduction to bioaccumulation, biotransformation and bioaccumulation and effects on people and environment	8
B: Analysis of toxicants and sanitation: Lethal and sub-lethal concentration, Analysis of NOEL, Analysis of LD 50 and LC50, Detoxication mechanisms, Sanitation and human health, sanitation practices and problems WHO and other organizations and their role in sanitation	7

Semester VI
DSE-E4 Environmental Toxicology– II
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Course Outcome:

1. To study various organ specific toxicities.
2. To study negative impacts of pesticides and xenobiotics.

Unit	Lecture Hours
Unit I	15
A: Genotoxicity and organ specific toxicity: Genotoxicity: mutation, mutagens, toxic agents in environment-industrial chemicals, food additives, safety regulations and legal control Organ specific toxicity studies- neurotoxicity, nephrotoxicity, hepatotoxicity, reproductive toxicity	8
B: Soil toxicology: Organic chemicals: fertilizers and pesticides and their impacts on soil, water and human health, Metals, plant nutrients, salts, acids and bases, Impacts of Barium, Arsenic, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Mercury, Nickel, zinc	7
Unit II	15
A: Pesticide toxicology: Types of pesticides- organochlorine, Organophosphate, Carbamates, pesticide and human health, Exposure to ionizing radiations, genetic effects, acute radiation syndrome, toxic residue, residual analytical methods, Factors affecting toxicity, evaluation of toxicity	8
B: Xenobiotics: Xenobiotics: concept, absorption and distribution, Chemical safety evaluation of toxicants, environmental hazards and environmental risk assessment, Environmental contamination and pollution, effects of xenobiotics	7

References

1. Environmental Sanitation, Ehlers, V.M. , McGraw Hill book Co.
2. Toxic chemicals, health and environment, Lave L.B., 1987, The Hopkin press Ltd., London
3. Basic environmental toxicology, Lorris G., CRC press
4. Introduction to environmental toxicology, Wayne G. Landi Ming Ho Yu
5. Toxicology-the basic science of poisons, Louis J Cassarate, Mc Millan Publishing Co. Inc. New York
6. Principle and practices in toxicology in Public health, Ira s. Richard Jones and Bartlett Publishers

DSC-P8 -LAB COURSE (Semester V)

Sr. No.	Name of Experiment
1	Study of census by capture and recapture method
2	Study of pugmark
3	Bird watching
4	Visit to wildlife sanctuary
5	Study of human wildlife conflict in local area
6	Study of population census by transect and camera trapping method
7	Study of ecotourism activities in local area
8	Visit to NGO working for wildlife conservation
9	Preparation of compost
10	Field visit

DSC-P9 -LAB COURSE (Semester V)

Sr. No.	Name of Experiment
1	Determination of carbonates and bicarbonates from water sample
2	Determination of ammonia from water sample
3	Langelier calcium carbonate saturation index
4	Determination of nitrite from water sample
5	Determination of nitrate from water sample
6	Determination of Sulphate from water sample
7	Determine phosphate from given water sample
8	Study of carcinogens and teratogens
9	Study of bioassay techniques
10	Study of LD50 and LC50
11	Study of bioremediation technique

DSC-P10 -LAB COURSE (Semester VI)

Sr. No.	Name of Experiment
1	Study of measures to restore fertility of soil
2	Preparation of vermicompost
3	Study of bio-indicators in local area
4	Study of nursery management practices
5	Study of carbon sequestration
6	Study of carbon footprints
7	Preparation of herbarium
8	Field visit to wildlife sanctuary

