

अंतरी पेटवू ज्ञानज्योत



(NAAC RE-ACCREDITED)

**NORTH MAHARASHTRA UNIVERSITY,
JALGAON**

**Syllabus for
S. Y. B. Sc.
Semester I & II**

ENVIRONMENTAL SCIENCE

w. e. f.

June 2016

North Maharashtra University, Jalgaon
Syllabus S. Y. B. Sc. Environmental Science
(June 2016)

1. Each theory course is divided into 6 units and to be completed in 48 lectures of 50 min duration in each semester.
2. Practical examination of laboratory course shall be conducted per semester.
3. Each Theory/Practical course will be of 100 marks (40 marks internal and 60 marks-external examination)

Theory Courses

Semester – I

ENVI - 211: ECOLOGY
ENVI - 212: ENVIRONMENTAL MICROBIOLOGY

Semester – II

ENVI - 221: SOCIAL ENVIRONMENT AND THEIR CONSERVATION
ENVI - 222: APPLIED AND INDUSTRIAL MICROBIOLOGY

Practical Courses

ENVI - 213: LABORATORY COURSE BASED ON THEORY PAPERS - I
ENVI - 223: LABORATORY COURSE BASED ON THEORY PAPERS - II

COURSE STRUCTURE

Course code	Title of course	Semester	Lectures	Marks	
				External	Internal
Envi: 211	Ecology	I	48	60	40
Envi: 212	Environmental Microbiology	I	48	60	40
Envi: 213	Laboratory Course Based on Theory Papers	I	48	60	40
Envi: 221	Social environment and their conservation	II	48	60	40
Envi: 222	Applied and Industrial Microbiology	II	48	60	40
Envi: 223	Laboratory Course Based on Theory Papers	II	48	60	40

S.Y. B.SC. ENVIRONMENTAL SCIENCE

ENVI.-211- ECOLOGY

Sem – I

Periods – 48

Introduction to Ecology: Definition of Ecology, Historic Background, Ecology in India, Aims and Scope of Ecology, Ecological concepts, Sub Divisions (Based on Taxonomic Affinities, Habitat and Levels of Organization). (08)

Abiotic Factor: Climatic Factors (Light, Temperature, Precipitation, Humidity), Topographic Factors, Edaphic Factors- Definition and Importance of Soil, Composition of Soil. (08)

Biotic Factors: Relationship among Organisms, Positive Interactions- Commensalism, Proto cooperation and Mutualism, Negative Interactions- Competition, Predation, Parasitism and Antibiosis. (08)

Ecosystem: Meaning of Ecosystem, Types of Ecosystem, Components of Ecosystem, Functioning of Ecosystem, Ecosystem Productivity, and Stability of Ecosystem. (08)

Human Population: Introduction, Definition and Types of Population, Population Characteristics-Population Size and Density, Dispersion, Age Structure, Natality, Mortality and Life Tables, Population Explosion in India. (08)

Population Ecology: Population Growth when resources are not limited, Population Growth when resources not limited, Population interactions (Competition, predation and mutualism), Evolution among population. (08)

References:

1. Savindra Singh (2002): Environmental Geography – Prayag Pustak Bhavan, Allahabad
2. P. D. Sharma(2010): Ecology and Environment – Rastogi Publications, Meerut
3. S.T.Ingle et. al. (2005): Environmental Studies – Prashant Publication House, Pune
4. P.S. Verma and V. K. Agrawal (1998): Environmental Biology (Principles Of Ecology), S. Chand and Company Ltd., New Delhi.

S.Y. B.SC. ENVIRONMENTAL SCIENCE
ENVI.-212- ENVIRONMENTAL MICROBIOLOGY

Sem – I

Periods – 48

History of Microbiology- History, Contribution in Microscopy, Controversy over Spontaneous Generation, Important Contribution in Development of Microbiology. (08)

Introduction of Microbiology- Definition of Microbiology, Types of Microbiology, Introduction to Applied Branches in Microbiology. (08)

Microscopy – General principles of Microscopy, Applications and Importance of Microscope, Compound Microscope- Its Parts with function, Oil Immersion Objective, Working Distance, Abbreviation, Resolving Power, Numerical Aperture, Ray Diagram, Applications, Special Features and Comparative Study of Following Microscope – Compound and Electron Microscope, Principles and Applications of Phase Contrast Microscope, Fluorescent Microscope, Dark Field Microscope. (10)

Stains and Staining Procedures- Definition of Dye and Stain, Classification of Stain- Acidic, Basic and Neutral, Theories, Procedures and Mechanism of Simple Staining, Gram Staining, Acid – Fast Staining, Negative Staining, Special Staining, Control of Micro Organisms. (08)

Prokaryotic and Eukaryotic Cell Structure- Nuclear Organization, Chromosomes, Nuclear Division, Cell Membrane, Cell Wall, Respiration. (06)

Pure Culture Technique- Method of Selection, Physical, Chemical and Biological Methods of isolating pure culture- Streak Plate, Spread Plate and Enrichment Culture Technique. (08)

References:

1. Dr.A.M.Deshmukh (1996): Outlines of Microbiology, Krishnai publication, Karad.
2. R.C. Dubey, D.K.Maheshwari (1993): A Textbook of Microbiology, S.Chand and company Ltd. New Delhi.
3. R.C. Dubey, D.K.Maheshwari (1993): A Textbook of Biotechnology, S.Chand and company Ltd. New Delhi.

S.Y. B.SC. ENVIRONMENTAL SCIENCE
ENVI.-221- SOCIAL ENVIRONMENT AND THEIR CONSERVATION

Sem – II

Periods - 48

Social Environment: Social Environment and their conservation, Urban problems related to energy, Resettlement and Rehabilitation of people – its problems and concern, Development, Gaya Hypothesis, Sustainability, Sustainable Development, Environmentally Sensitive Development, Sustainable Environment, Planning and Management. (08)

Environmental Monitoring and Impact Assessment: Ecological Indicators (Bioindicators), Biological Monitoring Programme, Environmental Impact Assessment – Concept, Objectives, and Projects covered, Procedure, Environmental Appraisal Committee, Environmental management Plan. (08)

Wildlife Conservation: Introduction, Concept of Conservation, Wild life conservation, Reason for extinction of Wildlife, Need for wildlife conservation, Protection of endangered species and wildlife management in India *w.r.t* Sanctuaries, National Parks and Project Tiger. (08)

Environmental Resources: Importance of resources, Resources – Meaning and concept, Perception of resource availability, Classification of resources – Dasmann's classification (1976), O.S.Owen's Classification (1971), General Classification, Ecological Resources, Resource use and Environment. (10)

Forest Resources and Conservation: Sources, Forest Cover, Deforestation, Desertification, Demand and supply of wood, Afforestation, Strategies to demands and conservation, Protection forestry. (06)

Introduction to Environmental Laws: Indian Environmental Laws, General laws, Special Laws – Forest Conservation Act (1980), Wildlife Protection Act (1972), The Water (Conservation and Prevention of Pollution) Act (1974) and The Air (Conservation and Prevention of Pollution) Act (1981). (08)

References:

1. Savindra Singh (2002): Environmental Geography – Prayag Pustak Bhavan, Allahabad
2. P. D. Sharma(2010): Ecology and Environment – Rastogi Publications, Meerut
3. S.T.Ingle et. al. (2005): Environmental Studies – Prashant Publication House, Pune
4. P.S. Verma and V. K. Agrawal (1998): Environmental Biology (Principles Of Ecology), S. Chand and Company Ltd., New Delhi.

S.Y.B.SC.ENVIRONMENTAL SCIENCE

ENVI-222-APPLIED AND INDUSTRIAL MICROBIOLOGY

Sem-II

Periods: 48

Microbiology of Air: Techniques for Microbial examinations, Solid -liquid impingement, Droplet infectious dust. (06)

Microbiology of Water: Water bacterial flora Determination of sanitary quality Faecal pollution Indicators Bacterial techniques Standard plate counts test for coli-forms: Membrane filter techniques Presumptive completed confirmed test, MPN, IMVIC test, Purification of drinking water & its significance. (10)

Microbiology of soil and sewage: Physical, Chemical, Microbial characteristics, Sewage types-chemical and Microbial, BOD and COD, Treatment and disposal-septic tank Imhoff tank, Physical and biological treatment. (08)

Microbiology of Food: Microbial spoilage of bread, Meat, Eggs, Pickles, General principals and methods of food preservation, Filtration and centrifugation, sun drying, High and low temperature, Irradiation, Un-aerobiosis, Food infection -Salmonellosis, Food poisoning-Clostridial, Staphylococcal. (08)

Industrial Microbiology: Basic concept of fermentation, Types of fermentation, Microbes in industrial processes-Saccharomyces cerevisiae -ethanol, penicillium chrysogenum-penicillin, Aspergillus oryzae- amylase- Streptomyces olivaceous, Vitamin B12 Bacillus thuringiensis bioinsecticide. (08)

Medical Microbiology: Basic concept of infection, Pathogenesis and virulence of micro-organisms, Type of diseases, Morbidity and Mortality rate, Transmission of diseases, General principals of prevention and control, Study of diseases-dysentery, Bacillary, Tetanus, Amoebic and cholera. (08)

References:

1. Dr.A.M.Deshmukh (1996): Outlines of Microbiology, Krishnai publication, Karad.
2. R.C. Dubey, D.K.Maheshwari (1993): A Textbook of Microbiology, S.Chand and company Ltd. New Delhi.
3. R.C. Dubey, D.K.Maheshwari (1993): A Textbook of Biotechnology, S.Chand and company Ltd. New Delhi.

S.Y.B.SC.ENVIRONMENTAL SCIENCE

Envi: 213 – LABORATORY COURSE BASED ON THEORY PAPERS (For Sem I)

Sr. No.	Title of the Practical
1	Study of microscopy
2	To study the microbiological equipments.
3	Preparation of microbial media and sterilization
4	Study of staining techniques.
	1) Simple or Monochrome staining
	2) Negative Staining
	3) Gram Staining
5	Isolation of Bacteria from curd and its Gram Staining
6	Isolation and enumeration of Soil bacteria by Spread plate Technique
7	Isolation, purification and identification of fungi from soil
8	To study the Ecological adaptations in Wetland plants
9	To study the Ecological adaptations in Mesophytes
10	To examine the organisms present in the water sample by Hanging Drop Technique.
11	To study and analyze the Physical parameters of solid waste
12	To study and analyze the Chemical parameters of solid waste

Envi: 223– LABORATORY COURSE BASED ON THEORY PAPERS (For Sem II)

Sr. No.	Title of the Practical
1	Determination of dissolved organic matter from the soil by Walkey and Black method
2	To measure the light intensity through Lux Meter
3	To find out the Leaf Area Index (LAI) of given plant leaves
4	To compare Biomass and Net Primary Production of Grazed and Un grazed Area
5	To study the Biotic Components of Pond Ecosystem
6	To study Primary Productivity of Water Body.
7	To determine the minimum size of Quadrat by 'Species Area Curve Method'
8	Study of Quality criteria of Water for Drinking Purpose
9	To study the Presumptive, Confirmed and Completed tests (MPN) for drinking water.
10	Determination of BOD of given sewage water sample
11	To study the construction and working of Effluent Treatment Plant
12	Assessment of Atmospheric Fungi using Petri plate method