

## Course Descriptions 3<sup>rd</sup> SEMESTER

### CORE COURSES

#### **ENS301CR: Natural Resources**

**(4 credits)**

##### **Credit I: Mineral resources**

- 1.1. Classification of mineral resources
- 1.2. Metals and minerals from land and their global distribution
- 1.3. Metals and minerals from oceans and their global distribution
- 1.4. Metals and mineral deposits in India with special reference in J&K
- 1.5. Environmental consequences of mineral exploitation

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##### **Credit II: Water resources**

- 1.1. Inventory of earth's water resources: Surface and groundwater
- 1.2. Water resources of India with special reference to Kashmir
- 1.3. Global water budget
- 1.4. Surface and ground water resources: Global consumption pattern
- 1.5. Water resource management

MM

##### **Credit III: Bio-resources**

- 1.1. Animal resources: current status with special reference to India
- 1.2. Fishery resources of India with special reference to J&K
- 1.3. Plant resources
- 1.4. Forest resources of India: Timber and non timber
- 1.5. Rangelands

NA

##### **Credit IV: Energy resources**

- 1.1. Renewable energy resources
- 1.2. Non-renewable energy Resources
- 1.3. Nuclear energy
- 1.4. Concept of green fuels
- 1.5. Hydrogen as a source of energy

MAJ

#### **ENS302CR: Environmental Impact Assessment**

**(04 credits)**

##### **Credit I: Fundamentals of EIA**

- 1.1. Environment impact assessment: Concept, objectives and approaches
- 1.2. Strategic environmental assessment
- 1.3. EIA guidelines 2006 and amendments
- 1.4. Protocol for environment impact statements
- 1.5. Public participation in environmental decision making

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##### **Credit II: EIA methodologies**

- 1.1. EIA methods
- 1.2. Baseline data generation
- 1.3. Air and water quality assessment
- 1.4. Ecological assessment
- 1.5. Social impact assessment

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**Credit III: EIA Case studies**

- 1.1. Hydro power, irrigation and drainage
- 1.2. Industrial estates and Parks
- 1.3. Highways and Railways
- 1.4. Thermal power projects
- 1.5. Cement and Chemical industries

AJ

**Credit IV: Ecological modeling**

- 1.1. Role of models in ecology
- 1.2. Components of a model
- 1.3. Classes of mathematical models
- 1.4. Models of population (growth and interaction) and pollutant dispersal
  - a. Lotka – Volterra model
  - b. Leslie’s matrix model
  - c. Gaussian plume model
- 1.5. Modeling of air quality, water quality and noise characteristics

BAG

**ENS303CR: Laboratory Course**

**(04 credits)**

**Course Contents**

- 1. Case studies based on environmental laws
- 2. Survey of different residential areas for determining the prevalence of different air, water, soil and food borne diseases
- 3. EIA – Leopold Matrix method and case studies
- 4. Socio-economic studies – preparing of questionnaire and case studies
- 5. Computation of standard deviation, standard error and coefficient of variation
- 6. Computation of correlation and regression
- 7. One way and two way classification of ANOVA
- 8. Land use / land cover classification from satellite data
- 9. Delineation of drainage of a given area from satellite data
- 10. Delineation of point, line and polygon themes
- 11. Waste auditing of any institution/ organization
- 12. Working and design of treatment plants
- 13. Spring and stream order classification
- 14. Study of colonization potential of periphyton on artificial substrates
- 15. Study of morphogenetic response of explants on media
- 16. Collection and demonstration of the pharmacognostic characters of important medicinal plants
- 17. Comparative anatomical study of mesophytes, hydrophytes and xerophytes
- 18. Collection and identification of common aquatic macrophytes
- 19. Field trip to National park/wildlife sanctuary/industrial area
- 20. Study of insect fauna in different environments

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**DISCIPLINE CENTRIC ELECTIVE**

**ENS304DCE: Environmental Laws**

**(04 credits)**

**Credit I: Environmental Protection**

- KM {
- 1.1. Environment protection: Provisions of constitution (article 21,48A, 51A, and 253)
  - 1.2. National efforts on environmental protection, laws and policy in India
  - 1.3. International efforts for environment protection (Stockholm, Kyoto protocol)
  - 1.4. CITES (1973)
  - 1.5. Earth Summit

**Credit II: National Laws-I**

- SUB {
- 1.1. Indian forest act (1927), forest conservation Act (1980) and rules (1981)
  - 1.2. Wildlife protection Act (1972) and amended (2002) and J & K wildlife (protection) Act (1978) as amended in (2002)
  - 1.3. The Water (Prevention and Control of Pollution) Act (1974) as amended up to (1988) and rules (1975)
  - 1.4. The Air (Prevention and Control of Pollution) Act as amended by amendment Act (1987) and rules (1982)
  - 1.5. The Environmental (Protection) Act (1986)

**Credit III: National Laws-II**

- SUB {
- 1.1. Hazardous waste management and handling rules (1989)
  - 1.2. Biomedical waste (management and handling) rules (1998)
  - 1.3. Noise pollution (regulations and control) rules (2000)
  - 1.4. Municipal solid wastes (management and handling) rules (2000)
  - 1.5. The EPA rules (1986)

**Credit IV: National Laws-III**

- KM {
- 1.1. Biological diversity Act (2002)
  - 1.2. Public liability insurance act (1991)
  - 1.3. Intellectual property rights and patent act (2005)
  - 1.4. National environment tribunal act (1995)
  - 1.5. National green tribunal act (2010)

**ENS305DCE: Environmental Biotechnology**

**(04 credits)**

**Credit I: Introduction to environmental biotechnology**

- RN {
- 1.1. Biotechnology
    - a. Concept and environmental relevance
    - b. Environmental risks
  - 1.2. Elementary information of gene transfer, brief account of cloning vehicles
  - 1.3. Recombinant DNA technology and its applications.
  - 1.4. Environmental Genomics: A key to understanding biology, pathophysiology and disease
  - 1.5. Molecular taxonomy: documenting biodiversity by DNA barcoding

**Credit II: Eco-friendly role of animals**

- NA {
- 1.1. Vermiculture technology
    - a. Earth worms and soil productivity
    - b. Earthworm culture and vermi-composting

- NA { 1.2. Aquaculture improvement through biotechnology  
1.3. Fish farming through biological wastes  
1.4. Stem cell and animal cloning  
1.5. Biological control of insects -definition, principles and control mechanisms

- ANK { **Credit III: In-vitro storage of plants**  
1.1 Tissue culture: Concept and importance  
1.2 Micropropagation: Techniques and application  
1.3 Conservation: Short term, medium term and long term  
1.4 Recent developments in cryopreservation  
1.5 Biotechnology in biodiversity conservation: Germplasm conservation , Gene banks and DNA banks

**Credit IV: Biotechnology in environmental management**

- RN { 1.1. Biosensors and bioindicators  
1.2. Biotechnology in pollution control  
1.3. Biodegradation and bioremediation  
1.4. Emerging environmental biotechnological trends  
1.5. Genetically modified organisms and bio-safety: a general account

**ENS306DCE: Remote Sensing and GIS (02 credits)**

- MM { **Credit I: Remote-sensing**  
1.1. Concept and overview of remote sensing: Concept of resolution-spatial, spectral, radiometric and temporal  
1.2. Remote Sensing satellites: LANDSAT & IRS satellite series  
1.3. Electromagnetic spectrum: EMR sources-active & passive, radiation laws  
1.4. Fundamentals of image interpretation and processing  
1.5. Aerial photographs and their types on the basis of look angle

- MM { **Credit II: Geographic information system**  
1.1. Global positioning system : Basic principles and functioning  
1.2. Development of GIS, functional requirements of GIS: hardware configuration and software modules  
1.3. Geographic data: Spatial and non-spatial, data models: raster and vector  
1.4. Remote sensing and GIS integration  
1.5. Application of remote sensing and GIS in:  
a. Monitoring and management of biodiversity  
b. Integrated watershed development and  
c. Environmental impact assessment

**ENS307EA: Ecological Tour to Ladakh (02 credits)**

During 3<sup>rd</sup> semester, students will be required to go for the field study tour within Jammu & Kashmir carrying 02 credits which will form a component of the elective allied. One credit will be given for participation and one credit for field collection, tour report and viva-voce.

**GENERIC ELECTIVE**

**ENS308GE: Crenobiology**

**(02 Credits)**

**Credit I**

- 1.1.Springs as critical biotopes
- 1.2.Classification of springs
- 1.3.Spring discharge and biology of spring biotopes
- 1.4. Delineation of spring protection zones
- 1.5.Vulnerability assessment and mapping of spring waters

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**Credit II**

- 1.1.Inventory and monitoring of springs
- 1.2.Spring water geochemistry and recharge
- 1.3.Springs as ecosystems
- 1.4. Case study of major springs
- 1.5.Conservation and management of spring ecosystems

**ENS309GE: Understanding of Enzymology**

**(02 Credits)**

**Credit I**

- 1.1.Historical perspectives of enzymology
- 1.2.Classification of enzymes
- 1.3. Enzyme assay and enzyme activity nits
- 1.4.Nature of enzymes
- 1.5.Factors affecting enzyme activity.

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**Credit II**

- 1.1.Enzyme kinetics
- 1.2.Michaelis- Mention equation and its modification
- 1.3.Enzyme inhibition
- 1.4.Basic concept of Isozymes and allosteric enzymes
- 1.5.Clinical significance of enzymes

**OPEN ELECTIVE**

**ENS310OE: Environmental Protection**

**(02 Credits)**

**Credit I**

- 1.1. Role of an individual in conservation of natural resources
- 1.2. General idea about environmental laws
- 1.3. International conventions (Stockholm declaration)
- 1.4. Kyoto protocol and Montreal protocol
- 1.5. Earth summit

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**Credit II**

- 1.1. Environment management
- 1.2. Control of soil, water and air pollution
- 1.3. Solid and hazards waste management
- 1.4. Biodiversity conservation
- 1.5. Natural resource management

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