



SYLLABUS FOR UNDERGRADUATE PROGRAMME

ENVIRONMENTAL STUDIES

(INTERDISCIPLINARY COURSE)

Under National Education Policy – 2020

(Effective from the Academic Session 2023-2024)

(Semester - I, III & IV)

**MAHARAJA BIR BIKRAM UNIVERSITY
AGARTALA, TRIPURA: 799004**

INTERDISCIPLINARY COURSE
Syllabus for Undergraduate Course 1st Semester
Under NEP 2020

Environmental Studies

(Number of theory credits-03)
Number of Lecture Hours 48 hours

Total marks-100

Unit-1. Basic Concepts of Environmental Studies

12 hrs

Definitions and principles of Environment; Structure and components of Environment- Atmosphere, Hydrosphere, Lithosphere, Biosphere; Multi disciplinary nature of Environmental Studies; Scope and importance of Environmental Studies- different environment related day celebration and their significance; Need for environmental awareness among general public

Unit-2. Natural Resources

12 hrs

Concept of Renewable and Non-renewable resources; Land resources –Land degradation, soil erosion and desertification; Forest Resource - Deforestation: Causes, consequences and remedial measures; Water Resources: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state); Energy resources: Environmental impacts of energy generation use of alternative and nonconventional energy sources

Unit-3. Environmental Problems and global environmental issues

12 hrs

Classification of environmental problems; Green House effect; Climate change; Acid deposition; Desertification; Ozone layer depletion.

Unit-4. Environmental Sustainability & Environmental Literacy

12 hrs

Environmental Sustainability: Millennium Development Goals, Sustainable Development Goals; National and International Conventions: Earth Summit 1992, United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, Convention on Biological Diversity, United Nations Convention to Combat Desertification (UNCCD), Vienna Convention on the Protection of the Ozone Layer, Convention on Migratory Species (CMS), International Union for Conservation of Nature (IUCN), Convention on International Trade of Endangered Species of Wild Flora and Fauna (CITES), Ramsar Convention on Wetlands, Basel Convention on Trans-boundary Movement of Hazardous Substances; Environmental Ethics: Anthropocentric View, Bio-centric View, Eco-centric View; Environmental literacy (formal and non-formal education)

Suggested Reading :

- Asthana, D. K. (2006). Text Book of Environmental Studies. S. Chand Publishing.
- Basu, M., Xavier, S. (2016). Fundamentals of Environmental Studies, Cambridge University Press, India
- Bharucha, E. (2015). Textbook of Environmental Studies.
- Barry, R. G. 2003. Atmosphere, Weather and Climate. Routledge Press, UK.
- Mastters GM. Introduction to Environmental Engineering & Science. Prentice Hall of India
- Cunningham, W.P. and Cunningham, M.A., 2007. Principles of Environmental Science, Inquiry and Solutions. Special Indian Edition. McGraw Hill Education (India) Pvt. Ltd., New Delhi.
- Fehling, M., Nelson, B.D., and Venkatapuram, S., 2013. Limitations of the Millennium Development Goals: a literature review. Global Public Health. Vol.8 (10), pp. 1109- 1122.
- Miller, G.T. and Spoolman, S.E., 2013. Environmental Science. 14th edition. Environmental Science. Brooks/Cole Cengage Learning, USA.
- Miller, Jr., G.T., 2007, Living in the Environment, Principles, Connections and Solutions. 15th edition. Brooks/Cole Cengage Learning, USA.
- Misra, S.P. and Pandey, S.N., 2018. Essential Environmental Studies. 4th edition. Ane Publications, New Delhi.
- Sharma, P.D., 2015-16. Ecology and Environment. 12th edition. Rastogi Publications, Meerut
- Wright, R. T. and Boorse, D.F., 2015. Environmental Science: Towards a Sustainable Future. 12th edition. Pearson India Education Services Pvt. Ltd., NOIDA, India

Important Links

- Agenda 21, a comprehensive document.
- <https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf> International Union for Conservation of Nature,
- <https://www.iucn.org/about> The Basel Convention on Transboundary Movement of Hazardous Substances,
- <http://www.basel.int/theconvention/overview/tabid/1271/default.aspx> The Convention on Biodiversity,
- <https://www.cbd.int/> The Convention on International Trade of Endangered Species,
- <https://www.cites.org/eng/disc/what.php> The Convention on Migratory Species,
- <https://www.cms.int/> The Millennium Development Goals and indicators,
- <http://mdgs.un.org/unsd/mdg/Host.aspx?Content=Indicators/OfficialList.htm>. 87 The Montreal Protocol,
- <https://www.environment.gov.au/protection/ozone/> Environmental Sustainability montreal-protocol The Ramsar Convention on Wetlands,
- <https://www.ramsar.org/about/>. The report of World Commission on Environment and Development, "Our Common Future",
- <https://sustainabledevelopment.un.org/content/documents/5987ourcommon-future.pdf> The SDGs India report,

- <https://sustainabledevelopment.un.org/content/documents/16693India.pdf> The Stockholm Declaration.
- https://www.ipcc.ch/apps/nj-lite/srex/nj-lite_download.php?id=6471 The Sustainable Development Goals indicators,
- <https://unstats.un.org/sdgs/indicators/indicators-list/> The United Nations Convention to Combat Desertification,
- <https://www.unccd.int>. The United Nations Framework Convention on Climate Change (UNFCCC), <https://unfccc.int/about-us/about-the-secretariat>

INTERDISCIPLINARY COURSE
Syllabus for Undergraduate Course 3rd Semester
Under NEP 2020

Environmental Studies

(Number of theory credits-03)
Number of Lecture Hours 48 hours

Total marks-100

Unit-1. Ecology and Ecosystem

Ecosystem Structure: Physicochemical and Biological components of ecosystem; function of ecosystem: biogeochemical cycle and energy flow in ecosystem, different types of ecosystems (aquatic, forest, grassland, desert, Wetlands and Estuaries), Ecological succession; Climax community; Major Biomes of the World.

Unit-2. Biodiversity and its conservation

Concept of Biodiversity, genetic diversity, species diversity, ecosystem diversity); Value of Biodiversity; Causes of biodiversity loss, , Rare, Threatened and Endangered flora and fauna, Concept of Endemism and Invasive species, IUCN and Red Data Book; Global Biodiversity Hotspots, Strategies for Biodiversity Conservation Ex-situ, In-situ (Wild life sanctuaries, National Parks and Biosphere reserves, Gene and Seed bank.

Unit 3. Ecological Services and livelihood

Major groups of ecological services (provisioning, regulating, supportive and cultural). Economics of ecosystem services and biodiversity. Ecological services of terrestrial, aquatic desert ecosystems (carbon sequestration and storage, aesthetic views, flood regulation, sediment regulation, water supply, recreation etc.). Wetland ecosystem services and livelihood. Different functions of ecosystem, Ecosystems goods, Mountain and Forest ecosystem services and livelihood, , Ecotourism.

Unit 4. Natural hazards and Disaster Management

Definition of hazard and disaster; concept of risk and vulnerability; Types of hazards ; Natural Hazards-causes, consequences and mitigation; Earthquake, Tsunami, Volcanoes, Cyclone, Flood, Drought, Landslide - causes, types, adverse effects; Disaster management plan; Functions of NIDM and NDMA in disaster management.

Suggested reading

1. Anjaneyulu, Y. 2009. Introduction to Environmental Science, BSP Books Pvt. Ltd.,Hyderabad.
2. Botkin, D.B. and Keller, E.A. 2011. Environmental Science: Earth as a Living Planet. John Wiley and Sons, New Delhi.
3. Chapin III, F.S., Matson, P.A. and Vitousek, P.M. 2012. Principles of Terrestrial Ecosystem Ecology. Springer, New Delhi.
4. Chapman, J.L. and Reiss, M.J. 2006. Ecology - Principles and Applications. Second Edition. Cambridge University Press, Cambridge.

5. Cunningham, W. P. and Saigo, B.W. 2007. Environmental Science – A Global Concern. Eighth Edition. WCB/McGraw Hill, New York.
6. Joseph, K. and Nagendran, R. 2004. Essentials of Environmental Studies. Pearson Education Publisher, Delhi.
7. Principles of Ecology. S.Chand and Co.Ltd., New Delhi.
8. Sharma, P.D. 2004. Ecology and Environment. Seventh Edition. Rastogi Publication, Meerut.
9. Singh Savindra and Jeetendra, Disaster Management, Pravalika publication, Allahabad.
10. Verma, P.S. and Agarwal, V.K. 2005. Environmental Biology

INTERDISCIPLINARY COURSE
Syllabus for Undergraduate Course 4th Semester
Under NEP 2020
Environmental Studies
(Number of theory credits-03)
Number of Lecture Hours 48 hours

Total marks-100

Unit-1. Environmental Pollution and monitoring

Air pollution (Ambient air quality: monitoring and standards (National Ambient Air Quality Standards of India); air quality index; sources and types of pollutants (primary and secondary); smog (case study); effects of different pollutants on human health (NO_x, SO_x, PM, CO, CO₂, hydrocarbons and VOCs) and control measures; indoor air pollution: sources and effects on human health.),

Water pollution (organic waste and water pollution; eutrophication; COD, BOD, DO; effect of water contaminants on human health (nitrate, fluoride, arsenic, chlorine, cadmium, mercury, pesticides); water borne diseases; control measures) ,

Soil Pollution (Causes of soil pollution and degradation; effect of soil pollution on environment, control strategies). and noise pollution (sources; frequency, intensity and permissible ambient noise levels; effect on communication, impacts on life forms and humans - working efficiency, physical and mental health; control measures).

Unit-2. Environmental Movement and Environmental Legislation

The Constitution of India and provision--- Article 48A; Article 51 A(g), Forest and Wildlife laws: The Indian Forest Act 1927; The Wildlife (Protection) Act 1972; The Forests (Conservation) Act 1980, Laws for pollution control and Environmental Protection: The Water (Prevention and Control of Pollution) Act 1974; The Air (Prevention and Control of Pollution) Act 1981; The Environment (Protection) Act 1986; Noise Pollution (Regulation and Control) Rules 2000, The Biological Diversity Act 2002 ; The Schedule Tribes and other Traditional Dwellers (Recognition of Forests Rights) Act 2006; The National Green Tribunal Act 2010; scheme and labeling of environment friendly products, Ecomarks.

Environmental movements : Chipko, Silent valley, Bishnois of Rajasthan

Unit 3. Solid and Hazardous Waste Management

Sources and generation of solid waste, their classification and chemical composition; characterization of municipal solid waste; hazardous waste and biomedical waste. Impact of solid waste on environment; Different techniques used in collection, storage, transportation and disposal of solid waste (municipal, hazardous and biomedical waste); e-waste management; drawbacks in waste management techniques. Types of industrial waste: hazardous and non-hazardous; effect of industrial waste on air, water and soil; 4R - reduce, reuse, recycle and recover

Unit 4. ENVIRONMENTAL IMPACT ASSESSMENT

Environmental impact assessment (EIA): definitions, introduction and concepts; scope and methodologies of EIA; Environmental Impact Statement (EIS), Environmental Management Plan (EMP); Environmental audit; introduction to ISO and ISO 14000; sustainable development; status of EIA in India

Suggested reading :

1. Asnani, P. U. 2006. Solid waste management. India Infrastructure Report 570
2. Bansil, P.C. 2004. Water Management in India. Concept Publishing Company, India.
3. Blackman, W.C. 2001. Basic Hazardous Waste Management. CRC Press.
4. Barrow, C.J. 2000. Social Impact Assessment: An Introduction. Oxford University Press.
5. Bharucha, E. (2015). Textbook of Environmental Studies.
6. Gurjar, B.R., Molina, L.T. & Ojha C.S.P. 2010. Air Pollution: Health and Environmental Impacts. CRC Press, Taylor & Francis.
7. Hardy, J.T. 2003. Climate Change: Causes, Effects and Solutions. John Wiley & Sons.
8. Havlin J.L., Beaton J.D., Tisdale, S.L., Nelson W.L, 2013. Soil Fertility and Fertilizer: An Introduction to Nutrient Management (8th Ed.). PHI / Pearson.
9. Henry J.G. and Heinke G.W. 2004. Environmental Science and Engineering (2nd Ed.). PHI.
10. Hester, R.E. & Harrison, R.M. 1998. Air Pollution and Health. The Royal Society of Chemistry, UK
11. Kenneth Shultz, Wiley, 2014. Environmental Management Plans Demystified: A Guide to Implementing ISO 14001
12. Larry Canter 2015, Environmental Impact Assessment: A Practical Guide, McGraw-Hill Education
13. Marriott, B. 1997. Environmental Impact Assessment: A Practical Guide. McGraw-Hill, New York, USA.
14. Masters, G.M., and Ela W.P., 2008. Introduction to Environmental Engineering and Science (3rd Ed.). Pearson
15. Miller, G.T 2012. Environmental Science. Wadsworth Publishing Co.
16. P. Leelakrishnan, Environmental Law in India, LexisNexis India, ISBN: 978-9351438215.
17. Rosencranz, A., Divan, S., & Noble, M. L. 2001. Environmental law and policy in India. Tripathi 1992
18. Sairam Bhat, Environmental Law and Policy in India, Oxford University Press India, ISBN: 978-0199489724.
19. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.