Shri Lal Bahadur Shastri National Sanskrit University.
(Central University) B-4 Qutab Institutional Area
New Delhi-110016
Department of Modern Knowledge (Adhunik Gyan)
Teaching Programme and Course
M.A (Environmental Studies)
NEP- Mandate (2022-23)

M.A.ENVIRONMENTAL STUDIES (CCFPU, 2 Year Program)					
M.A 1st Year		Semester-1			
S. No.	Course Code	Course Title	Theory	Internal Assessment / Practical	Total Credit/Marks
1.	MES-001	Fundamentals of Environmental Studies	80	20	5 Credit / 100
2.	MES-002	Basic of ecology and conservation	80	20	5 Credit / 100
3.	MES-003	Energy and Environment	80	20	5 Credit / 100
4.	MES-004	Traditional Indigenous Ecological Knowledge	80	20	5 Credit / 100
				Total	20 Credits
M.A. 1st Year		Semester-2			
S. No.	Course Code	Course Title	Theory	Internal Assessment / Practical	Total Credit/Marks

1.	MES-005	Natural Resource Degradation and Conservation	80	20	5 Credit / 100
2.	MES-006	Biodiversity and Sustainable Development	80	20	5 Credit / 100
3.	MES-007	Environmental Pollution	80	20	5 Credit / 100
4.	MES-008	Culture and Environment	80	20	5 Credit / 100
		or			
5.	MES-R01	(Research) R 1: Research Foundation			5 Credit / 100
				Total	20 Credits

M.A. 2nd Year		Semester-3			
S. No.	Course Code	Course Title	Theory	Internal Assessment / Practical	Total Credit/Marks
1.	MES-E01/E02/E03/E04	Elective Paper-1 (Opt any 1 of given 4 Elective Papers)	80	20	5 Credit / 100
2.	MES-E01/E02/E03/E04	Elective Paper-2 (Opt any 1 of given 4 Elective Papers)	80	20	5 Credit / 100
3.	MES-R02	(Research) R 2: *Coursework*	80	20	5 Credit / 100
4.	MES-R03	(Research) R 3: Dissertations (Synopsis) Writing	80	20	5 Credit / 100
				Total	20 Credits

M.A. 2nd Year		Semester-4			
S. No.	Course Code	Course Title	Theory	Internal Assessment / Practical	Total Credit/Marks
1.	MES-E01/E02/E03/E04	Elective Paper-3 (Opt any 1 of given 4 Elective	80	20	5 Credit / 100

		Papers)			
2.	MES-E01/E02/E03/E04	Elective Paper-4 (Opt any 1 of given 4 Elective Papers)	80	20	5 Credit / 100
3.	MES-RC4	(Research) R 4: Dissertations (Equivalent to two papers)	80	20	5 Credit / 100
				Total	20 Credits
				Total	80 Credits

Program Outcomes (POs): After completing this program-

1. **Multidisciplinary Environmental Knowledge**
   Students will possess a comprehensive understanding of environmental studies, integrating scientific, social, cultural, and policy perspectives to address contemporary environmental challenges.
2. **Analytical and Research Competency**
   Students will develop critical thinking, problem-solving, and research skills, enabling them to analyze environmental processes, assess ecological impacts, and apply data-driven solutions.
3. **Sustainability and Conservation Skills**
   Students will acquire the ability to design and implement strategies for natural resource management, biodiversity conservation, and sustainable development practices.
4. **Policy and Legal Awareness**
   Students will understand national and international environmental policies, laws, and governance systems, preparing them for roles in advocacy, regulation, and policy-making.
5. **Integration of Traditional and Modern Knowledge**
   Students will integrate indigenous ecological knowledge with modern scientific approaches to promote sustainability and environmental resilience.
6. **Ethical and Professional Responsibility**
   Students will demonstrate environmental ethics, research integrity, and a commitment to sustainable practices in professional and academic pursuits.
7. **Effective Communication and Collaboration**
   Students will communicate environmental concepts effectively to diverse stakeholders and work efficiently in multidisciplinary teams.
8. **Lifelong Learning and Adaptability**
   Students will engage in independent, lifelong learning to keep pace with emerging environmental issues, technologies, and global sustainability debates.

Course Outcome (CO): After completing this course, student will able to gain -

1. Multidisciplinary Environmental Knowledge – Students will develop a comprehensive understanding of environmental studies, integrating scientific, social, and policy perspectives to address contemporary environmental challenges.

2. Analytical and Research Skills – Students will acquire critical thinking and research skills, enabling them to analyze environmental processes, assess ecological impacts, and develop data-driven solutions.

3. Sustainability and Conservation Strategies – Students wil demonstrate knowledge of natural resource management, biodiversity conservation, and sustainable development practices to promote environmental protection.

4. Environmental Law and Policy Awareness – Students will gain an understanding of environmental policies, laws, and governance structures at national and international levels, preparing them for roles in environmental advocacy and regulation.

5. Application of Traditional and Modern Environmental Knowledge – Students will be able to integrate indigenous ecological knowledge with modern scientific approaches to develop innovative solutions for environmental sustainability and resilience.

Semester-1 Paper 1: Fundamental of Environmental Studies
Learning Outcome: After completing this course, student will be able to- 1. Define and understand its role in addressing environmental issues through a multidisciplinary approach. 2. Analyse atmospheric processes and climatic- related phenomenon. 3. Identify sources of water pollution and demonstrate knowledge of water quality assessment and wastewater treatment techniques 4. Describe soil formation, classification, and the factors influencing soil properties in different environmental conditions. 5. Apply environmental knowledge to real-world challenges and advocate for sustainable practices and public awareness.

Learning Objective: By the end of this course, students will be able to:

1. Explain the multidisciplinary nature of environmental studies and its significance in addressing global environmental challenges.
2. Describe the structure and composition of the atmosphere and analyze key phenomena such as the greenhouse effect, global warming, ozone depletion, and climate change.
3. Understand the hydrologic cycle and water pollution, including types of pollutants, their effects, water sampling techniques, and wastewater treatment methods.
4. Explain soil formation processes, factors influencing soil development, soil classification, and the concept of soil complexity.

Unit	Content	Credit 5	Markes 80+20
Unit 1	Introduction: Definition, its multidisciplinary nature, Importance of Environmental studies. Need for Public awareness.		
Unit 2	Atmosphere: Composition of the earth, Atmosphere structure, Earth radiation balance, Greenhouse effect/ Global Warming, Ozone hole, Climatic changes, El Nino Phenomenon		
Unit 3	Water Resource: The hydrologic cycle, Types of water pollutants and their effect, water sampling and analysis, wastewater treatment.		
Unit 4	Soil: What is soil, Formation of soil, Factors in soil Formation, soil profile, Soil Classification, Paedogenic regimes and soil complex.		
Unit 5	Assignment/ Practical		

Suggestive reading:

1. Kaushik and Kaushik, Perspective in Environmental Studies, NEW AGE PUBLICATION(P) LIMITED, PUBLISHERS, New Delhi 2016.

2. Rao C. S, Environmental Pollution Control Engineering, NEW AGE PUBLICATION(P) LIMITED, PUBLISHERS, New Delhi .

3 . Sharma P.D, Ecology and Environment, RASTOGI PUBLICATION, Meerut.

4. Raven, P.H., Berg, L.R., & Hassenzahl, D.M. (2018). *Environment*. John Wiley & Sons.

5. Botkin, D.B. & Keller, E.A. (2014). *Environmental Science: Earth as a Living Planet*. John Wiley & Sons.

6. Miller, G.T. & Spoolman, S. (2021). *Living in the Environment*. Cengage Learning.

7. Cunningham, W.P. & Cunningham, M.A. (2017). *Environmental Science: A Global Concern*. McGraw-Hill

8. Chiras, D.D. (2016). *Environmental Science*. Jones & Bartlett Learning.

Semester-1

Paper 2: Basics of ecology and conservation

Learning outcome: After completing this course, students will be able to:

1. Define ecology and its key principles, including historical developments and major ecological divisions.
2. Identify and explain different types of species interactions, such as mutualism, competition, predation, and parasitism.
3. Compare various habitat ecosystems, understanding their unique characteristics and ecological significance.
4. Illustrate the structure and function of ecosystems, emphasizing energy flow, food webs, and nutrient cycling.
5. Demonstrate the ability to analyze ecological data and apply theoretical knowledge to practical environmental problems.

Learning Objective: By the end of this course, students will be able to:

1. Understand the fundamental concepts of ecology, including its historical background and major divisions.
2. Analyze biotic interactions among organisms, distinguishing between positive and negative relationships in ecosystems.

3. Describe different types of habitat ecology, including freshwater, marine, estuarine, terrestrial, and desert ecosystems.

4. Explain the structure and function of ecosystems, focusing on energy flow and biogeochemical (nutrient) cycles.

5. Apply ecological principles to real-world environmental issues through practical assignments and case studies.

Unit	Content	Credit 5	Marks 80+20
Unit1	Introduction: what is Ecology, Historical background, Basic concept of ecology, Major division of ecology.		
Unit 2	Biotic factor (Interaction among Organisms) : Types of Interaction; positive and negative		
Unit 3	Habitat Ecology: Freshwater ecology, Marine water ecology, Estuarine ecology, Terrestrial ecology, Desert ecology.		
Unit 4	Ecosystem: What is ecosystem, structure and function of ecosystem, Biogeochemical (Nutrient) cycles in ecosystem		
Unit 5	Assignment/ Practical		

Suggestive reading:

1. Odum, E.P. & Barrett, G.W. (2005). *Fundamentals of Ecology*. Brooks/Cole, Cengage Learning.

2. Smith, T.M. & Smith, R.L. (2015). *Elements of Ecology*. Pearson Education.

3. Molles, M.C. (2015). *Ecology: Concepts and Applications*. McGraw-Hill Education.

4. Begon, M., Townsend, C.R., & Harper, J.L. (2006). *Ecology: From Individuals to Ecosystems*. Blackwell Publishing

5. Miller, G.T. & Spoolman, S. (2018). *Environmental Science*. Cengage Learning.

6. Sharma P.D, Ecology and Environment, RASTOGI PUBLICATION, Meerut.

Semester-1

Paper 3: Energy and Environment

Learning Outcome: : After completing this course, students will be able to:

1. Differentiate between conventional and non-conventional energy sources and analyse India's energy scenario.
2. Gain an in-depth understanding of Indian environmental laws, their importance, and the challenges in their implementation.
3. Comprehend the goals and significance of environmental education and recognize key environmental organizations and their roles.
4. Explain major environmental challenges faced by India and other developing countries including their causes and impacts.
5. Develop critical thinking skills to evaluate environmental policies, propose solutions, and contribute towards sustainable development.

Learning Objective: After completing this course, students will be able to:

1. Understand the classification of energy sources (conventional and non-conventional).
2. Understand the significance of environmental laws in environmental protection and able to identify challenges in the implementation and enforcement of environmental laws.
3. Identify the goals and objectives of environmental education in sustainable development and explore the roles of various environmental organizations and agencies at national and international levels.
4. Analyze the social, economic, and political aspects of environmental challenges.
5. Explore possible solutions and policy measures to mitigate environmental problems.

UNIT	Content	Credit 5	Markes 80+20
Unit 1	Introduction: Sources of energy, Conventional and non- conventional sources of energy, Energy scenario in India, Non-conventional renewable sources in India.		
Unit 2	Environmental Laws: Needs of Environmental laws, Indian Environmental laws, Problems in making and implementing the Environmental law.		

Unit 3	Environmental Education: Need of Environmental education, Goals and need of Environmental Education, Environmental Organisation and Agencies, Ministry of Environment, Forest and Climate change ,GCI, Important acronyms.		
Unit 4	Environmental challenges: Genesis of environmental challenges, challenges confronting India and other development countries.		
Unit 5	Assignment/ Practical		

Suggestive reading:

1. Boyle, G. (2012). *Renewable Energy: Power for a Sustainable Future*. Oxford University Press.
2. Twidell, J. & Weir, T. (2015). *Renewable Energy Resources*. Routledge.
3. Ministry of New and Renewable Energy Reports, Government of India (GOI).
4. Divan, S., & Rosencranz, A. (2001). *Environmental Law and Policy in India*. Oxford University Press.
5. Shastri, S. C. (2015). *Environmental Law in India*. Eastern Book Company.
6. Government Reports and Acts (EIA 2006, Water Act 1974, Air Act 1981, etc.).
7. Palmer, J. A. (1998). *Environmental Education in the 21st Century: Theory, Practice, Progress and Promise*. Routledge.
8. UNESCO (1978). *The Tbilisi Declaration on Environmental Education*
9. Reports from the Ministry of Environment, Forest, and Climate Change (MoEFCC), GOI.
10. Gadgil, M., & Guha, R. (1995). *Ecology and Equity: The Use and Abuse of Nature in Contemporary India*. Penguin Books.
11. Carson, R. (1962). *Silent Spring*. Houghton Mifflin.
12. Reports from UNEP, IPCC, and Indian Government environmental agencies.

Semester-1

Paper 4: Traditional Indigenous Ecological Knowledge

Learning outcome: After completing this course, students will be able to:

1. understand the importance of our indigenous environmental knowledge system

2. learn how indigenous environmental knowledge system will be effective to conserve natural resources in the scenario of globalization

3. Increased ability to communicate the complex relationship between nature and culture and biological and cultural diversity

4. to know about and socio-cultural heritage and how TEK can augment and sensitize the youth in adding on key insights to government programs.

Learning Objective: After completing this course, students will be able to:

1. Know the meaning of "traditional environment knowledge" and its significance in the contemporary world.

2. Aware of the concept of "traditional environment knowledge" in sync with cultural beliefs and ecosystem interconnectedness to ecosystem services.

3. Be acquainted with about the traditional indigenous knowledge of the elements of earth.

UNIT	Content	Credit 5	Marks 80+20
Unit1	Introduction: Concept, Meaning and Definition, Approaches of Traditional Ecological Knowledge, Identification, Documentation, and Validation of Traditional Ecological Knowledge, Significance of Indigenous Traditional Ecological Knowledge		
Unit 2	Indigenous Traditional Ecological Knowledge (I-TEK), Sustainability and Ecosystem Services: Traditional Knowledge and Sustainability, Traditional Knowledge and Ecosystem Services, Nature Based Solutions (NBSs). Case study- Crop cultivation, community based		

	Environment friendly practices Yoga and its Universal Appeal- Discussions on worldwide popularity of Yoga and meditation		
Unit 3	Traditional Knowledge System and Practice: Case Studies: Agriculture, Land and Soil, Water, Forest. Case Study- Ancient Indian Water management and irrigation methods -A region-based study of natural water resources and aquifers and types of irrigation. Metallurgy – Coins, traditional Indian Metal Carvings, Discussions on historical periods and their architectural influences- Textile technology- region/culture specific fiber, fabric and weaving		
Unit 4	Policy Implications/Way Forward: Revival and recognition of Traditional Ecological Knowledge, Integration of Intergenerational transmission of Traditional Ecological Knowledge, Need for Policy framework and Role of Various Initiatives with respect to India, Strength, Weakness, Opportunities and Threats (Challenges)- SWOT for Indigenous Traditional Ecological Knowledge (I- TEK). Policy Implications/Way Forward: Revival and recognition of Traditional Ecological Knowledge, Integration of Intergenerational transmission of Traditional Ecological Knowledge, Need for Policy framework and Role of Various Initiatives with respect to India, Strength, Weakness, Opportunities and Threats (Challenges)- SWOT for Indigenous Traditional Ecological Knowledge (I- TEK)		
Unit 5	Assignment/ Practical		

Suggestive reading:

1. Agarwal, A., & Narain, S. (1997). Dying Wisdom: Rise, fall and potential of India's traditional water harvesting systems (Vol. 4): Centre for Science and Environment New Delhi. Chapter 2. Pp 25-268.

2. Agrawal, A. (1995). Dismantling the divide between indigenous and scientific knowledge. Development and Change, 26(3), 413-439.

3. Berkes, F. and Gadgil, M. (1995). Indigenous Knowledge for biodiversity conservation. Ambio, 22(2-3): 151-156.

4. Berkes, F., Colding, J., & Folke, C. (2000). Rediscovery of traditional ecological knowledge as adaptive management. Ecological applications, 10(5), 1251-1262.

5. Berkes, F. (1999). Sacred Ecology: Traditional Ecological Knowledge and Resource Management. Milton Park: Taylor & Francis.

6. Basham, A.L. ed. A Cultural History of India. OUP, 1997.

7. Brokensha D.W., Warren D.M. and Werner, O. (1980). Indigenous Knowledge Systems and Development. Washington DC: University Press of America.

8. Brush, S. (1993). Indigenous knowledge of biological resources and intellectual property rights: The role of anthropology. American Anthropologist, 95 (3): 653–86.

9. Ford, J. and Martinez, D. (2000). Traditional ecological knowledge, ecosystem and environmental management. Ecol. Application, 10: 1249-1250.

10. Melissa, N. and Shilling, D. (2018). Traditional Ecological Knowledge: Learning from Indigenous Environmental Sustainability. Cambridge University Press.

11. Medury R.K., Kotak, B.P., Mandayam, Y.R., Sridharan, K.S., Raghavan, M. (2024). Indian Knowledge System & Heritage. IKS Division, Ministry of Education, GOI

12. Mishra, P.K. and Rai S.C. (2013). Use of Indigenous Soil and Water Conservation Practices among Farmers in Sikkim Himalaya. Indian Journal of Traditional Knowledge, 12(3), July, Pp. 454-464. NISCAR, CSIR, New Delhi.

13. Rai, S.C. and Mishra, P.K. (2022). Traditional Ecological Knowledge of Resource Management in Asia. Springer Nature Switzerland AG.

14. Stori F.T., Peres C.M., Turra, A. and Pressey R.L. (2019) Traditional Ecological Knowledge Supports Ecosystem-Based Management in Disturbed Coastal Marine Social-Ecological Systems. Frontier in Marie. Science, 6:571.

15. Sivaramakrishnan V (Ed.), Cultural Heritage of India-course material, Bharatiya Vidya Bhavan, Mumbai. 5th Edition, 2014.

13. Warren D.M., Slikkerveer L.J. andBrokensha, D. (1995) The cultural dimension of development: Indigenous Knowledge Systems. Intermediate Technology Publications, London.

The students can choose any four papers out of the basket of five papers in semester -2 (which will include paper- Environmental studies (research foundation)).

Semester-2 Paper 1: Natural Resource degradation and conservation
Learning outcome: After completing this course, students will be able to 1. Identify different types of natural resources and understand the growing pressure on them. 2. Explain soil degradation processes and apply soil conservation techniques to prevent land degradation 3. Gain knowledge about India's water resources, wetlands, and effective conservation techniques like rainwater harvesting. 4. Comprehend the significance of forests, the impact of deforestation, and conservation efforts such as afforestation and agroforestry. 5. Develop problem-solving skills to propose sustainable strategies for conserving natural resources and mitigating environmental impacts

Learning Objective: : After completing this course, students will be able to-

1. Define natural resources and classify them based on their types and availability. And analyse the increasing pressure on natural resources due to population growth and industrialization.

2. Understand soil degradation, including erosion, land degradation, and its impacts. And explore soil conservation and reclamation techniques to maintain soil fertility.

3. Examine India's water resource scenario and the importance of water conservation. Learn about wetland conservation rainwater harvesting, and sustainable water use practices.

4. Understand the importance of forests in ecological balance and economic growth.

5. Develop an understanding of policies and sustainable strategies for natural resource conservation.

UNIT	Content	Credit 5	Marks 80+20
Unit1	Natural resource: what is natural resource, types of Resources, increasing pressure on Natural resources.		
Unit 2	Soil resource: Soil resource degradation (soil erosion) Land use, Land degradation, soil conservation/reclamation.		
Unit 3	Water resource: Water resource scenario in India, Wetland conservation, water conservation, rainwater harvesting etc		
Unit 4	Forest resource: Importance of forest resources, conservation of forest; Deforestation , Afforestation, social and		

	agroforestry in India.		
Unit 5	Assignment/ Practical		

Suggestive reading:

1. Miller, G. T., & Spoolman, S. (2018). *Environmental Science*. Cengage Learning.
2. Odum, E. P. (2005). *Fundamentals of Ecology*. Cengage Learning India.
3. Brundtland Commission Report (1937). *Our Common Future*. UN Report on Sustainable Development.
4. Brady, N. C., & Weil, R. R. (2016). *The Nature and Properties of Soils*. Pearson.
5. Lal, R. (2015). *Soil Erosion and Conservation*. Springer.
6. Indian Council of Agricultural Research (ICAR) Reports on soil conservation and reclamation.
7. Gleick, P. H. (2014). *The World's Water: The Biennial Report on Freshwater Resources*. Island Press.
8. Agarwal, A., & Narain, S. (1997). *Dying Wisdom: Rise, Fall and Potential of India's Traditional Water Harvesting Systems*. Centre for Science and Environment (CSE).
9. Central Water Commission (CWC) Reports on India's water resource management.
10. Gadgil, M., & Guha, R. (1992). *This Fissured Land: An Ecological History of India*. Oxford University Press.
11. Champion, H. G., & Seth, S. K. (1968). *A Revised Survey of the Forest Types of India*. Government of India Publications.
12. Forest Survey of India (FSI) Reports on deforestation and afforestation efforts.

Semester-2

Paper 2: Biodiversity and sustainable development

Learning outcome: By the end of this course, students will be able to:

1. Define biodiversity and discuss its biogeographical classification, hotspots, and conservation strategies.
2. Describe ecological succession, its causes, types (Hydrosere, Lithosere), and the climax concept.
3. Identify key microorganisms used in environmental biotechnology and their role in nitrogen fixation and soil fertility.
4. Critically assess human impacts on natural resources and their role in environmental degradation.
5. Discuss international frameworks and policies for biodiversity conservation and sustainable development.

Learning Objective: By the end of this course, students will be able to:

1. Understand the concept and significance of biodiversity and its conservation strategies.
2. Explain ecological succession and its different types, along with their role in ecosystem development.
3. Explore the role of environmental biotechnology in sustainable agriculture and ecosystem restoration.
4. Analyze the principles and challenges of sustainable development at national and international levels.
5. Evaluate global efforts in biodiversity conservation and sustainable resource management.

UNIT	Content	Credit 5	Marks 80+20
Unit1	Biodiversity ; what is biodiversity; Bio geographical classification of India; Hotspot of Biodiversity ;Endanger and endemic species ;Conservation of Biodiversity ;National parks ,Wild life Sanctuary and Biosphere reserve. Biodiversity or Bio piracy? International Efforts for Conservation of		

	Biodiversity; CBS Milestone.		
Unit 2	Ecological succession , Cause of succession, basic types of succession , Hydrosere, Lithosere ,Climax concept in succession.		
Unit 3	Environmental Biotechnology: Rhizobia spp., Asymbiotic Nitrogen –fixers; Algal Fertilizer.; Mycorrihiza		
Unit 4	Sustainable Development: Concept and strategies; Principal of Sustainable development; Human Impact on Natural resources : Cause of Unsustainability ; Threats to sustainable Development. International efforts on sustainable development.		
Unit 5	Assignment/ Practical		

Suggestive reading:

1. Groom, M. J., Meffe, G. K., & Carroll, C. R. (2006). *Principles of Conservation Biology* (3rd ed.). Sinauer Associates..

2. Myers, N. (1988). *Threatened Biotas: "Hotspots" in Tropical Forests*. The Environmentalist, 8, 187-208.

3. Odum, E. P., & Barrett, G. W. (2005). *Fundamentals of Ecology* (5th ed.). Thomson Brooks/Cole

4. Connell, J. H., & Slatyer, R. O. (1977). *Mechanisms of Succession in Natural Communities and Their Role in Community Stability and Organization*. American Naturalist, 111(982), 1119–1144.

5. Scragg, A. (2005). *Environmental Biotechnology*. Oxford University Press.

6. Maier, R. M., Pepper, I. L., & Gerba, C. P. (2009). *Environmental Microbiology* (2nd ed.). Academic Press.

7. Singh, H. B., Sarma, B. K., & Singh, D P. (2016). *Microbial Inoculants in Sustainable Agricultural Productivity* (Vol. 1 & 2). Springer.

8. Goodland, R. (1995). *The Concept of Environmental Sustainability*. Annual Review of Ecology and Systematics, 26, 1–24.

9. Sachs, J. D. (2015). *The Age of Sustainable Development*. Columbia University Press.

Semester-2

Paper 3: Environmental Pollution

Learning outcome: By the end of the course, students will be able to:

1. Explain different types of pollution (air, water, land, and noise), their sources, and their harmful effects on the environment and human health. .

2. Identify major air and water pollutants, including carbon compounds, sulfur oxides, heavy metals, and particulate matter, and evaluate their environmental impact.

3. Understand various techniques for assessing air and water quality and explore preservation and pollution control measures, including waste management strategies.

4. Describe the impact of metal contamination, pesticides, and radioactive waste on land and discuss solid and biomedical waste management approaches.

5. Define bioremediation, understand its scope and importance, and evaluate its role in mitigating environmental pollution.

Learning Objective: By the end of the course, students will be able to:

1. Define air, water, land, and noise pollution, and recognize their primary sources and pollutants.

2. Analyze the impact of pollutants such as heavy metals, hydrocarbons, and photochemical products on ecosystems and human well-being.

3. Explore various air and water quality assessment methods and understand strategies for pollution prevention and control.

4. Investigate solid and biomedical waste management techniques and assess the environmental risks of land pollution.

5. Explain the principles, scope, and benefits of bioremediation and assess its practical applications in environmental restoration.

UNIT	Content	Credit 5	Marks 80+20
Unit1	Air pollution: what is pollution; source of air pollution; its harmful effect; Air Pollutant(carbon compound, sulphur ,nitrogen oxides, Halogenated cardon, hydrocarbons, metals, photochemical products, particulate matter. Acid rain: An invisible Thread. Air quality assessment in India. General methods of preservation and control of Air pollution. Noise pollution.		
Unit 2	**Water pollution: what is water pollution;sourse of water** pollutant; Ground water pollution,Marine water pollution (lead pollution,Hg pollution etc.) Effect of water pollution; Water pollution controlling measures.		
Unit 3	Land Pollution: What is land pollution,(Metal, pesticide pollution; Radioisotopes pollution) solid waste pollution and management ;Bio-medical waste.		
Unit 4	Bioremediation of polluted Environment: What is Bioremediation; Need, scope Merits of Bioremediation.		
Unit 5	Assignment/ Practical		

Suggestive reading:

1. Cunningham, W.P., & Cunningham, M.A. (2017). *Environmental Science: A Global Concern*. McGraw-Hill.

2. Peirce, J.J., Vesilind, P.A., & Weiner, R.F. (1998). *Environmental Pollution and Control*. Butterworth-Heinemann.

3. Garg, S.K., & Garg, R. (2017). *Environmental Science and Ecological Studies*. Khanna Publishers.

4. Masters, G.M., & Ela, W.P. (2008). *Introduction to Environmental Engineering and Science*. Pearson.

5. Henry, J.G., & Heinke, G.W. (1996). *Environmental Science and Engineering*. Prentice Hall.

6. Purchit, S.S., & Ranjan, R. (2007). *Ecological and Environmental Studies*. Agrobios.

7. Nathanson, J.A. (2020). *Basic Environmental Technology: Water Supply, Waste Management, and Pollution Control*. Pearson.

8. Das, S. (2021). *Bioremediation: Current Research and Applications*. Springer.

Semester-2

Paper 4: Culture and Environment

Learning outcome: By the end of the course, students will be able to:

1. Explain various forms of human adaptation to the environment, including hunting, pastoralism, shifting cultivation, and industrialization.
2. Analyze the social and cultural implications of different adaptation strategies, particularly in relation to land and forest policies from colonial to post-colonial periods.
3. Evaluate the role of environmental culture in business and the relationship between corporate environmental strategies and sustainable practices.
4. Critically assess development policies and their impact on environmental degradation, equity, and resource exploitation.
5. Develop practical insights into human-environment interactions through assignments and case studies.

Learning Objective: By the end of the course, students should be able to:

1. Identify and describe key forms of human adaptation to environmental conditions and economic transitions.
2. Investigate historical and contemporary policies on land and forests and their impact on societies.
3. Examine corporate environmental responsibility and its influence on sustainable business practices.
4. Discuss the debates surrounding development and environmental degradation in terms of both physical and socio-economic factors.
5. Apply theoretical knowledge to practical assignments related to human adaptation, development, and environmental policies.

UNIT	Content	Credit 5	Marks 80+20
Unit1	Human adaptation: Basic form of human adaptation to the environment: Hunting and Food gathering Pastoralism; shifting cultivation ; agricu ture ; Transition to market economy and industrialization.		
Unit 2	Social and cu ture implication of various forms of adaptation: Evolution of political economy of the state (land and forest policies :colonial to post -colonial).		
Unit 3	Environmental culture in Business : Development of environmentally aware corporate culture, linkage between Organisational Environmental Culture and Environmental Strategy.		
Unit 4	Development and Environment: Current dedates; How development policy define degradation in largely physical terms, and not in term of access inequities and exploiatation		
Unit 5	Assignment/ Practical		

Suggestive reading:

1. Baruah, Sanjib, 2005, Durable Disorder: Understanding the Politics of Northeast India, O.U.P.
2. Gadgil Madhav and Guha Ramachandra, 1992, This Fissured land: An Ecological History of India,O.U.P.
3. Gole, Ann and Bhoju Ram Gujar, 2002. In the Time of Trees and Sorrows: Nature, Power, and Memoryin Rajasthan, Durham, Duke University Press.
4. Guha, Ramachandra, Social Ecology, 1993, Oxford University Press. Ingold Tim, 1994, Companion Encyclopedia of Anthropology, Routledge.
5. Kelley Alley, 2002, On the banks of the Ganga: when waste water meets a sacred river,University of Michigan Press, Ann Arbor.
6. Leach, M. and R. Mearns (Ed.), 1996, The Lie of the Land: Challenging Received Wisdom on the African Environment, London and Oxford: The International African Institute and James Curry.
7. Milton, Kay, 1993, Environmentalism: The view from Anthropology, Routledge
8. Mehta, Lyla, 2001, The Manufacture of Popular Perceptions of Scarcity: Dams and Water relatedNarratives in Gujarat, India. World Development 29 (12), pp. 2025-2042.
9. Schama, Simon, 1995, Landscape and Memory, London, Harper Collins.Savyasachi, 1994, The Tiger and the Honeybee. Seminar 423: 30-35
10. Therner, Daniel ed, 1996 Agricultural Atlas of India , 1920, Karachi, Oxford University Press.White, Leslie A., 1959. The Evolution of Culture, McGraw-Hill,

New York.
11. Zimmerman, F. 1982, The Jungle and the Aroma of Meats, Berkeley, University of California Pres.

Semester -2

Paper 5:Research foundation

Learning Outcomes: After completing this course students will able to -

1. Develop a foundational understanding of analytical and critical thinking skills essential for environmental research.
2. Gain the ability to frame research problems, formulate research questions, design experiments, and analyze data effectively.
3. Enhance scientific communication skills through writing, poster presentations, and oral presentations.

Learning Objectives: After completeling thiscourse students will able to -

1. Key environmental research topics, including ecosystems, biodiversity, pollution, and environmental policies.
2. Research methodology, including problem framing, hypothesis formulation, and experimental design.
3. Present research findings effectively in various formats, such as publications, posters, and oral presentations.

CONTENT	CREDIT	MARKS
	5	80+20
The course will lay a foundation for advancing the mind-set towards analytical and critical thinking. The course will typically outline core for environmental studies research and learning objectives for a beginner		

researcher (topics such as natural rescurces, ecosystems, biodiversity, pollution, social issues, environmental policies and legislation can be included). The course will allow the student to develop and frame research problem, formu ate research questions and objectives, design experiments (field and lab), basic data analysis, computer tools, basic of modelling and writing rationally with novelty. Presentation of research findings in the form of pub cations, brief scientific nugget, posters and oral presentation. The paper will equip students intending to pursue research and derive meaningful conclusions.		

Suggestive Readings

1. Kothari, C.R. (2004). *Research Methodology: Methods and Techniques*. New Age International.
2. Creswell, J.W. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Sage Publications.
3. Singh, P. (2019). *Environmental Science: Principles and Practices*. Cambridge University Press.
4. Cunningham; W.P., & Cunningham, M.A. (2020). *Environmental Science: A Global Concern*. McGraw-Hill.
5. Bryant, R.L., & Bailey, S. (1997). *Third World Political Ecology*. Routledge.

1. *Statistical Methods* by S.P. Gupta, 45th Edition, Sultan Chand & Sons, India (2019)
2. *Environmental Modeling: Finding Simplicity in Complexity* by John Wainwright and Mark Mulligan, 2nd Edition, Wiley-Blackwell (2013)
3.

6.

Semester-3

Elective Paper-1 (Opt any one elective paper)

Semester-3 Elective Paper-2(Opt any one elective paper)

Semeste-3 Paper 3: Coursework		
Learning outcome: By the end of the course, students will be able to: 1. Develop the research competency and enable to conduct independent research by applying scientific methodologies, statistical analysis, and literature review techniques using databases like Web of Science and Scopus. 2. Acquire skills in scientific writing, good laboratory practices, and research ethics, enabling them to publish research findings effectively.		
Learning Objective: By the end of the course, students will be able to: 1. Equip students with knowledge of scientific research methodologies, statistical tools, and instrumentation for lab and fieldwork. 2. Train students in conducting literature surveys, writing scientific reports, and adhering to ethical research and publication standards.		
Content	Credit 5	Marks 100

The research course work is crucial to grasp the general concept of postgraduate education. The research course work is designed to provide students with the opportunity to delve deeper into their field of interest, acquire specialised knowledge, and increase their research competency. The coursework programme will include lectures, engage in tutorials, complete assignments, and prepare the student for the master's dissertation. The course work will augment the student with the following idea and information- what is scientific research, lab and field instrumentation, statistical analysis, literature survey- Web of Science, Scopus etc., scientific writings, and good lab practices. The course work will also include the component of research and publication ethics. The research course work will include one theory paper based on above components.

The department shall assign suitable topics for the candidate to undertake review of literature in the area of research candidate will opted to work in. The department may also assign a topic other than the topic of interest. The Review work, will be submitted to experts comprising of Department Advisory Board Members for evaluation. A written satisfactory completion and evaluation report will be submitted by the Department Advisory Board Members based on the presentation and review made by the candidate.

Suggestive reading:

1. Kothari, C.R. & Garg, G. (2019) *Research Methodology: Methods and Techniques*. New Age International Publishers.

2. Creswell, J.W. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. SAGE Publications.

3. Day, R.A., & Gastel, B. (2012). *How to Write and Publish a Scientific Paper*. Cambridge University Press.

4. Montgomery, D.C. (2020). *Design and Analysis of Experiments*. Wiley.

5. Resnik, D.B. (2020). *The Ethics of Research: A Guide for Scientists*. Springer.

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Semester-3

Paper 4: Dissertations(synopsis) writing

Learning outcome: By the end of the course, students will be able to:

1. Improved Research Structuring Skills – Students will develop the ability to organize their research effectively, including selecting a suitable topic, defining clear objectives, and applying appropriate methodologies.

2. Enhanced Academic Writing and Ethical Awareness – Students will gain proficiency in writing a well-structured synopsis while adhering to ethical research practices and proper citation standards.

Learning Objective: By the end of the course, students will be able to:

1. Equip students with the necessary skills to develop a clear, coherent, and methodologically sound research synopsis.

2. Train students in critical thinking, literature review techniques, and ethical research practices to enhance the quality of their academic work.

Content	Credit	Marks
	5	100

A supervisor will play a vital role in assisting students with synopsis writing by offering guidance on topic selection, research objectives, and methodology. They will help refine ideas, ensuring that the research is well-structured and academically sound. By reviewing drafts, providing constructive feedback, and suggesting relevant literature, supervisors will enhance the clarity and depth of the synopsis. They will also ensure that ethical research standards and proper citation practices are maintained. Through their support, students will develop a well-organized and comprehensive synopsis that lays a strong foundation for their research work.

Suggestive reading:

1. Kothari, C.R. & Garg, G. (2019). *Research Methodology: Methods and Techniques*. New Age International Publishers.
2. Creswell, J.W. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. SAGE Publications.
3. Day, R.A., & Gastel, B. (2012). *How to Write and Publish a Scientific Paper*. Cambridge University Press.
4. Walliman, N. (2017). *Research Methods: The Basics*. Routledge.
5. Resnik, D.B. (2020). *The Ethics of Research: A Guide for Scientists*. Springer.

Semester-4 Elective Paper-1 (Opt any one elective paper)

Semester-4 Elective Paper-2 (Opt any one elective paper)

Semester-4 DISSERATION WRITING (Equivalent to 2 papers)
Learning outcome: By the end of the course, students will be able to: 1. To enable students to conduct an in-depth review or empirical study in their chosen research area, enhancing their analytical and critical thinking skills. 2. To train students in academic integrity by ensuring proper research methodology, plagiarisms checks, and effective dissertation presentation.
Learning Objective: By the end of the course, students will be able to: 1. **Advanced Research Skills** – Students will develop the ability to conduct independent research, analyze data, and synthesize findings to contribute to their field of study. 2. **Effective Communication and Presentation** – Students will enhance their ability to articulate research findings clearly and confidently through a Viva-voce presentation before the Department Advisory Board.

Content	Credit	Marks
	10	200

The Supervisor/Co-Supervisor(s) shall assign suitable topics to the dissertation candidate to undertake review/empirical work in the area of research in which the candidate opted to work. Supervisor may also assign a topic other than the topic of interest. The dissertation work, will be submitted to department after plagiarism check and further evaluated by experts comprising of Department Advisory Board Members. A Viva-voce presentation based on the dissertation will have to be made by the dissertation candidate at the end of the work before the Department Advisory Board Members.

Suggestive reading:

1. Kothari, C.R., & Garg, G. (2019). *Research Methodology: Methods and Techniques*. New Age International Publishers.
2. Creswell, J.W. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. SAGE Publications.
3. Madsen, D. (1992). *Successful Dissertations and Theses: A Guide to Graduate Student Research from Proposal to Completion*. Jossey-Bass.
4. Rudestam, K.E., & Newton, R.R. (2014). *Surviving Your Dissertation: A Comprehensive Guide to Content and Process*. SAGE Publications.
5. Resnik, D.B. (2020). *The Ethics of Research: A Guide for Scientists*. Springer.

Elective Papers

Paper E01: Social theory , Sociology of development and environment

Learning outcome: By the end of the course, students should be able to:

1. Critical y analyze the interconnections between development, progress, science, capitalism, and industrial sm,

2. Evaluating green critiques of industrialism, as well as post-colonial and post-structuralist critiques of development and participatory discourse.

3. Assess the impact of development on marginal zed communities and explore alternative perspectives on sustainability and equity.

Learning Objective: By the end of the course, students should be able to:

1. Define and differentiate key concepts such as development, progress, science, capitalism, and ndustrialism.

2. Examine green critiques of industrialism and their implications for sustainability and environmental justice.

3. Analyze post-colonial and post-structuralis critiques of development, particularly in relation to power, discourse, and participation.

4. Evaluate the socio-economic and cultural impacts of development on marginalized communities.

5. Explore alternative development models that prioritize equity, sustainability, and participatory approaches.

UNIT	Content	Credit 5	Marks 80+20
Unit1	The relationship between 'deve opment', 'progress', science, capitalism and industrialism		
Unit 2	Green critiques of industrialism Post-colonial and post-structuralist critiques of development and the discourse of participation.		
Unit 3	The impact of development on marginal peoples		
Unit 4	Re-evaluation of development in light of sustainability and social equity; contemporary critiques and models.		

Unit 5	Assignment/ Practical		

Suggestive reading:

1. Agarwal, Anil, et al, Eds., 1984, State of India's Environment, A Citizen's Report, Centre for Science and Environment, Delhi.
2. Borrie, W.D., 1988, Population, Environment and Society, O.U.P., U.K.
3. Chambers, Robert. 1983 Rural Development: Putting the Last First. London, Longman.Crush, Jonathan ed., 1995, The Power of Development', New York, Routledge.
4. Escobar Arturo, 1995, Encountering Development: The making and unmaking of the third world, Princeton University Press.
5. Gadgil, Madhav and Guha, 2001, Ramachandra, Ecology and Equity: The use and abuse of nature in contemporary India, Delhi, Penguin.
6. Gorz, Andre, 1980, Ecology as Politics, Boston, South End Press.
7. Hobart Mart, 1993, An Anthropological critique of Development: The Growth of Ignorance, Routledge. Krishna Sumi, 1966, Environmental politics, People's Lives and Development choices, Sage Publications,
8. New Delhi.
9. Kuper Adam, 1988, The Invention of Primitive Society, Routledge.
10. Leacock Eleanor and Lee Richard, 1982, Politics and History in Band Societies, Cambridge University Press.
11. O'Connor, Martin Ed., 1994, Is Capitalism Sustainable: Political Economy and the Politics of Ecology, New York, Guilford Press.
12. Peets Richard and Watts Michael, 1966, Liberation Ecologies: Environment, development, social movements, Routledge.

Scott, James, 1998, Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed, New Haven, Yale University Press.

Paper E02: ENVIRONMENTAL ETHICS AND PHILOSOPHY

Learning outcome: By the end of the course, students should be able to:

1. Develop a critical understanding of environmental ethics and philosophy, including the ethical responsibilities of individuals, businesses, and governments in addressing environmental degradation.

2. Analyze various schools of thought in environmental ethics, including eco-centric perspectives, cross-cultural views, and the intersection of nature with modernity, religion, and social values.

3. Evaluate ethical challenges related to corporate environmental responsibility, sustainable development, and governance at national and international levels.

4. Assess the ethical implications of resource consumption patterns, global equity disparities, and gender equity in environmental decision-making.

5. Explore the ethical foundations of environmental education, conservation ethics, and traditional value systems, particularly in the Indian context.

Learning Objective: By the end of the course, students should be able to:

1. Explain key concepts and theories of environmental ethics and their application in contemporary society.

2. Compare and contrast different ethical perspectives on nature, including deep ecology, animal rights, environmental justice, and cultural ecology.

3. Examine the role of businesses in environmental ethics, including corporate environmental responsibility, disclosure, and sustainability challenges.

4. Analyze global and national governance frameworks for environmental ethics and their impact on policy and decision-making.

5. Evaluate ethical issues related to resource consumption, social equity, and intergenerational justice, with a focus on environmental conservation and awareness.

UNIT	Content	Credit 5	Marks 80+20
Unit1	An Introduction to Environmental Ethics and Philosophy: Ethics in society; Environmental Consequences; Responsibility for Environmental Degradation Theories of Environmental Ethics and Philosophy: Different types of schools of thought vis-à-vis nature and environmental management. Values in modernity, anti-modernity, eastern and western cultures,nature and religion etc.		

Unit 2	Eco Centric Theories of Nature: Deep ecology and animal rights theories, environmental rights, environmental racism. Cross-cultural views on Nature: The relationship between humans, nature and adaptation. Theoretical frameworks of cultural and social ecology; debates on culture/nature divide.		
Unit 3	Environment and Business Ethics: Foundations of Environmental Ethics for Business, Corporate Environmental Ethics, Environmental Disclosure, Social and Ethical Issues for Sustainable Development, Business Ethics and Corporate Environmental Performance. Environmental Ethics and Issues of National and International Governance: changing nature of environmental ethics in relation to international and national paradigms of environmental		
Unit 4	Resource consumption patterns and the need for equitable utilization; Equity disparity in the northern and southern countries; Urban – rural equity issues; Need for gender equities; Preserving resources for future generations; The ethical basis of Environmental education and awareness; The conservation ethics and traditional value system of India.		
Unit 5	Assignment/ Practical		

Suggestive reading:

1. Aggarwal Anil & Narain Sunita, 1991, Global warming in an unequal world: A case of Environmental colonialism, Centre for Science & Environment.
2. Cooper, D.E. & Palmer, J.A., (Ed.), 1992, The Environment in question: Ethics & Global Issues, London, Routledge.
3. Des Jardius, J.R., 2001, Environmental Ethics: An Invitation to Environmental philosophy (3.Ed)Wadsworth Publ., Belmont, California.
4. Grim, John. A., 2001, Indigenous Traditions and Ecology (Ed.), Harvard University Press
5. Vandeveer, D.C.P. and Vandeveer, D., 2002, The Environmental Ethics and policy book: Philosophy,Ecology, Economics (3 Ed.), Wadsworth publishing, California.

6. Lesourd, J.B. and Schilizzi, S.G. M., 2001, The Environment in Corporate Management: New Directions and Economic Insights, Edward Elgar, UK.

Paper E03: Environmental History And Environmentalism

Learning outcome: By the end of the course, students should be able to:

1. Gain a comprehensive understanding of environmentalism, its ideological roots, and its historical development through modern environmental movements and theories like the Gaia hypothesis.
2. Analyze environmental history as natural history, exploring the concepts of wilderness and conservation in both developed and developing nations.
3. Critically evaluate the historical relationship between industrialization, modernization, and environmental change, particularly in relation to the history of science and technology.
4. Assess the environmental consequences of European colonial expansion, including its impact on ecosystems, species, and landscapes.
5. Engage in debates about colonialism as an environmental watershed, examining how imperialism contributed to environmental degradation and resource exploitation.

Learning Objective: By the end of the course, students should be able to:

1. Define and explain key concepts in environmental history, including environmentalism, conservation, and the Gaia theory.
2. Compare different perspectives on wilderness and conservation in developed and developing nations.
3. Investigate the role of industrialization and modernization in shaping environmental history and their impacts on natural systems.
4. Analyze the environmental consequences of European colonial expansion, including changes to flora,

fauna, and landscapes.

5. Critically assess historical debates on colonialism and environmental decline, exploring the long-term effects of empire on global ecosystems.

UNIT	CONTENT	Credit 5	Marks 80+20
Unit1	Introduction to the ideology of environmentalism and environmental history, Modern environmental movements. The Gaia theory		
Unit 2	Environmental History as Natural History: In the developed and developing nations. Ideas of wilderness and conservation		
Unit 3	Environmental History as a History of Industrialization and Anti-Industrialization: debates on the nature of modernization and industrialization in developed and developing countries. Issues of its links with history of science and technology.		
Unit 4	The Rise of European power and its consequences not only for peoples, but also for plants and pathogens, animals and landscapes. Nature and Empire: Debate on 'colonialism as a watershed'. Colonialism and the unleashing of destructive forces and the threat of general environmental decline.		
Unit 5	Assignment/ Practical		

Suggestive reading:

1. Arnold, David & Guha, Ramachandra (Ed.), 1995, Nature, Culture, Imperialism: Essays on the Environmental History of South Asia, Oxford University Press, Delhi.
2. Baviskar Amita, 2003, 'Tribal Discourse and Indian environmentalism in Greencugh, Paul and Anna Lowenhapept Tsing (Ed.), Nature in the Global South: Environmental Projects in South and Southern Asia, Durham and, London: Duke University Press/Orient Longman

3. Balee William, 1998, Advances in Historical Ecology, Columbia University Press, New York.
4 Beinart William and Coates Peter, 1995, Environment and History, London: Routledge.
5. Carson, Rachel, 1962, Silent spring. Houghton Miflin, Boston.
6. Crumley (Ed.) Santa Fe, 1994, Historical Ecology: Cultural knowledge & changing landscapes, School of American Research Press.
7. Gadgil, Madhav & Guha. R.C, 1992, This Fissured land: An Ecological History of India, O.U.P.
8. Greenough Paul and Anna L Tsingh Ed., 2003, Nature in the Global South, Delhi: Orient Longman.
9. Grove, R.H., V. Damodaran and S. Sangwaned, 1998, Nature and the Orient. Essays on theEnvironmental, History of South and South East Asia, O.U.P., Delhi.
10. Guha Ramachandra, 2000, Environmentalism, A Global History, Delhi, O.U.P.
11. McNeill, Robert, 2002, Something New Under the Sun, an Environmental History of the 20th century Penguin Press, Allen Lane.
12. Rangrrajan, Mahesh, 2001, India's Wildlife History, An Introduction; Permanent Black, Delhi.
Simmons. I.G., 1993, Environmental History: A Concise Introduction, Blackwell, Oxford.

Paper E04: Global Environmental Issue

Learning outcome: By the end of the course, students should be able to:

1. Develop an in-depth understanding of climate change debates, including scientific, political, and economic dimensions, and evaluate strategies for mitigating greenhouse gas emissions.

2. Analyze the environmental impacts of war, terrorism, and industrial activities, including nuclear warfare, chemical warfare, and hazardous waste disposal.

3. Critically examine global waste management policies, trade regulations on toxic waste, and the role of environmental activism in influencing waste governance.

4. Assess biod versity conservation strategies, conflicts between conservation and local communities, and issues such as biopiracy and intellectual property rights in biodiversity management.

5. Explore international environmental treaties, conventions, and protocols, evaluating their role in shaping global sustainability and resource management policies.

Learning Objective: By the end of the course, students should be able to:

1. Explain key concerns in climate change debates, including the scientific, political, and economic conflicts surrounding greenhouse gas emissions and mitigation strategies.
2. Investigate the environmental consequences of warfare and terrorism, focusing on nuclear, chemical, and biological weapons and their long-term ecological impacts.
3. Evaluate global waste management frameworks, policies on hazardous waste trade, and the role of environmental activism in addressing toxic waste issues.
4. Analyze the relationship between biodiversity conservation, local knowledge systems, and legal frameworks governing intellectual property and sustainable resource use.
5. Examine the significance of international environmental conventions and protocols in promoting conservation, waste management, and sustainable development at a global scale.

UNIT	Content	Credit 5	Marks 80+20
Unit1	**Climate Change:** Key concerns in the climate change debate, scientific and political conflicts concerning their impacts on natural resources, food production etc. and the techno-economic measures being used to reduce greenhouse emissions. Impact on War and Terrorism on the Environment: Nuclear Winter: Environmental Consequences of Nuclear War; Chemical & Biological Warfare; Impact of Nuclear Weapon Tests; Use of Depleted uranium shells; Impact of Destruction of Nuclear power plants; Burning of oil wells; Destruction of Chemical plants. Use of Incendiary Bombs (Napalm).		
Unit 2	Wastes: Regional and international frameworks for regulating trade in wastes, especially toxics. Policies and environmental activism around trade in toxic wastes such as asbestos, PVCs, lead, mercury, electronicwastes and other chemicals.		

	Biodiversity: Approaches to understanding of biodiversity, case studies of strategies for conservation and sustainable use of biological resources, case studies of conflicts (and their possible resolution) between conservation and local community practices, links between conservation, local knowledge and intellectualproperty and issues of biopiracy.		
Unit 3	Energy: The energy sector and environment including historical studies of coal and pollution in select countries; policies relating to sustainable energy use through select case studies (e.g. Germany, the Netherlands, Brazil, India) and their implications for global and local economies. Nuclear energy as an environmentally friendly/ degrading source of energy, again through select case studies (e.g. France, England, India and China). Global Environmental Issues in Industry: Business – Environment Debate: Ozone Depletion and Environment Change, International Business, Globalization and Sustainable Development, EnvironmentalManagement Norms and Certification, International Environmental Management Systems, Kyoto Protocol and CDM.		
Unit 4	International Conventions and Protocols: The treaties and conventions guiding the use of resources, disposal of waste and international cooperation in the fields of conservation and sustainability will be studied. Students will be introduced to a range of international protocols such as The Kyoto Protocol to the UN Convention on Climate Change, Basel Convention on the Control of Tran boundary Movements of Hazardous Wastes and Their Disposal, The Convention on Biological Diversity, Convention on Long-Range Tran boundary Air Pollution, The Montreal Protocol on Substances That Deplete the Ozone Layer and the United Nations Convention to Combat Desertification		
Unit 5	Assignment/ Practical		

Suggestive reading:

1. . Cartimes J. Jepma and Mohan Munasinghe, 1998, Climate change Policy, Cambridge University Press.Ehrlich, Paul et al: Long Term Biological consequences of Nuclear War,

1983 (Stanford University).
2. Howes, R.; Skea, J. and Whelan, B., 1997, Clean & Competitive? Motivating Environmental Performance in Industry
3. Kemp, D.D., 1990, Global Environmental Issues: A climatologized approach, Taylor and Francis,London.
4. Makofske, W.J. and Karlin, E.F., 1995, Technology and Global Environmental Issues, Addison Wesley, Longman, Toronto.
5. Russo, M. V., 1999, Environmental Management: Readings and Cases, ed., Houghton Mifflin Company,Boston, NY.
6. Shiva Vandana, 2005, Earth Democracy. Justice, sustainability and Peace, South End Press. Smith, P. and Warr, K., 1991, Global Environmental Issues, Hodder and Stoughton, London.
7. Susskind et. al. Lawrence (Ed.), 2002, Trans-boundary Environmental Negotiation: New Approaches to Global Cooperation.
8. Toman (Michael) (Ed.), 2002, Climate change, Economics and Policy, Cambridge University Press. Welford, R., 2000, Corporate Environmental Management: Towards Sustainable Development, Book 3,
9. Earthscan Publications Ltd, London.

Fee Structure, Seat Availability, Medium of Teaching ,Eligibility Criteria

1. Fee Structure:- Rupees 2500/- per semester
2. Seat Availability:- 20 seats
3. Medium of Teaching:- Hindi/English
4. Eligibility criteria:- Graduation from any stream with minimum one paper in environmental study/environmental science at graduation level.