SYLLABUS FOR THE BATCH FROM YEAR 2025 TO 2026

FOR

Certificate Course in Environmental Pollution and Management

(Credit Based Evaluation and Grading System)

Semester: I

EXAMINATIONS: 2025-2026

The Certificate Programme Offered:

- **Certificate Course in Environmental Pollution and Management (6 Months duration)**

Program Outcomes:

1.Fundamental Knowledge of Complex Environmental Issues: This certificate program is designed to provide students with advanced knowledge on complex environmental issues and their management.

2.Career Development &Enhancement: This program is tailored to provide the students with requiredknowledge andcritical thinking to work in the field and make important decisions about environmental issues and management.

3. Project Management and Technical skills: A comprehensive curriculum is designed to develop a technical skillsamong students to implement sustainable practices and managing environmental risks

Department of Botanical and Environmental Sciences

In collaboration with

Directorate of Open & Distance Learning and Online Studies

GURU NANAK DEV UNIVERSITY AMRITSAR

Certificate Course in Environmental Pollution and Management (Semester System) Offered by Department of Botanical & Environmental Sciences in Collaboration with Directorate of Open & Distance Learning and Online Studies, Guru Nanak Dev University Amritsar

Eligibility:

- 10+2or equivalent Examinations
- Any student pursuing Bachelor Degree, Master Degree, M.Phil., Ph.D. from GNDU campus constituted or affiliated college.

Semester I

Paper Code	Subject	Marks			Credits
		Internal Assessment	End Term	Total	
ODEPM111T	Environmental Issues	30	70	100	4
ODEPM112T	Solid Waste Management	30	70	100	4
ODEPM113T	Environmental Management	30	70	100	4
ODEPM114T	Environmental Impact Assessment	30	70	100	4
	Total Marks &Credits	**120**	**280**	**400**	**16**

Environmental Issues
Subject Code: ODEPM111T
(Semester- I)

Time: 03 HoursMax. Marks: 100 Marks

Internal Assessment: 30 Marks

End Term: 70Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section A

1.**Introduction to Environmental Issues:** Environmental issues and their global significance Key environmental principles and ethics, Human impact on the environment.

2.**Global Warming &Climate Change:**Green house gases and the greenhouse effect, Causes of climate change (human activities, natural factors), Impacts of climate change (sea level rise, extreme weather events, biodiversity loss), Mitigation strategies (renewable energy, carbon capture, policy change

Section B

3.**Global Biodiversity Loss:** Biodiversity and its Importance**,** Threats to biodiversity (habitat loss, overexploitation, invasive species)**,** Conservation strategies: In-situ, Ex-situ, National Legislation to protect biodiversity loss, Global initiatives

Section C

4.**Ozone Layer Depletion:** Chemistry of the ozone layer, Causes of ozone depletion (CFCs), and International agreements to address ozone depletion (Montreal Protocol).

5.**Acid Rain and Smog:** Causes, chemistry of formation and impact on living and non-living, case studies

Section-D

6.**Desertification and Population Growth:** Land degradation, causes, impacts, population growth, deforestation, urbanization and its impacts. National status of forest cover and legislation

7.**Sustainable Development:**Sustainable development goals and importance of natural resources.

References:

1.Cunningham, William P. and Mary Ann Cunningham (2015) *Environmental Science: A Global Concern.*Thirteenth edition, McGraw-Hill Education, NY.

2, Harris, Frances (Ed.)(2012) *Global Environmental Issues*, John Wiley & Sons, 2012

3.Asthana, D.K &Asthana, Meera (1998) *Environmental Problems and solutions*.S. Chand Publishing& company, New Delhi.

4.Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)

5.Agrawal, K.M. (2002).A textbook of Environment –Agrawal, Macmillan Publishers India

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Solid Waste Management
Subject Code: ODEPM112T
(Semester- I)

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70Marks

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SECTION-A

1. **Introduction to Solid Wastes:**Types, sources of solid waste, Physical and Chemical composition of solid waste. Solid waste management: Material flow in society, materials and energy recovery, Day to day solid waste management

SECTION-B

2. **Solid Waste Generation**: On site handling, storage and processing of solid waste. Collection of solid waste, Transfer and transport of solid waste, Laws and rules for solid wastes in India.

SECTION-C

3. **Solid Waste Processing:**Processing of solid waste, mechanical volume reduction, Thermal volume reduction. Composting and Vermi composting, Anaerobic digestion, Refuse Derived Fuels, Gasification, Pyrolysis.

SECTION-D

4. **Design of Landfill:** Design and operation of Landfills, Landfarming, Deep well injection. Methane emission estimates from Landfill sites. Overview of LandGeM software by USEPA.

5. **Waste Management:**Fly ash management, E-waste management, Biomedical waste management, Plastic waste management, Industrial and Agricultural waste Management.

References:

1. Freeman, H. (1989). Standard Handbook for Hazardous Waste Management, McGraw Hill.
2. Singh, J. and Ramanthan, A.L. (2010). Solid Waste Management: present and Future Challenges, IK International Publishing, New Delhi.
3. Kreith, F. and Tchobanoglous, G. (2002). Handbook of Solid Waste Management, McGraw Hill.
4. LaGrega, M., Buckingham, P. and Evans, J. (1994). Hazardous Waste Management, McGraw Hill.
5. Municipal Solid Wastes (management and Handling) Rules, 2000.
6. Peavy, H.S., Rowe, D.R. and Tchobanoglous, G. (1985). Environmental Engineering. McGraw-Hill Book Company, Singapore.
7. Pichtel, J (2005). Waste Management Practices: Municipal, Industrial and Hazardous, CRC Press.

Environmental Management
Subject Code: ODEPM113T
(Semester- I)

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70Marks

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SECTION-A

1. **Air Pollution Mitigation and Control:** Atmospheric composition, reactions in the lower andhigher atmosphere, air quality standards and criteria. Airpollution control equipment viz. settling chambers, inertial separators, cyclones, multiplecyclones, baghouse filters, scrubbers or wet collectors, electrostatic precipitators, advantagesand disadvantages of control equipment. Air pollution abatement technologies including vehicular emissions.

SECTION-B

2. **Water Resource Planning and Management**:Necessity,aspects of water resources planning, water resource development. Needs and opportunities, social goals.Monitoring and Analysis of Water/Wastewater.Sewage treatment, industrial wastewater treatment, aerobic and anaerobic methods of wastewater treatment.

SECTION-C

3. **Bioremediation:**Types of bioremediation, biosorption, cautions for using bioremediation, and biodegradation of pesticides, oilspills, TNT wastes, dyes etc. Microbial transformationof chemical contaminants, Phytoremediation, Criteria for Bioremediation as an option, Advantages of Bioremediation approaches to environment safety.

SECTION-D

4. **Solid Waste Management with Vermicomposting:**Organic waste processing, composting, anaerobic digestion, vermiculture and vermicomposting, essential precautionary steps in vermicomposting, vermiculturing and protein production, vermiwash, overall benefits, economics and marketing, Vermicomposting using termites.

References:

1. Abbasi, S.A. and Ramasami, E. (1999). Biotechnological Methods of Pollution Control. Universities Press, Hyderabad.
2. Alexander, M. (1999). Biodegradation and Bioremediation. Acadamic Press, San Diego.
3. Gothandam, K.M., Ranjan, S., Dasgupta, N. and Lichtfouse, E. (2020). Environmental Biotechnology Vol. 3. Springer International Publishing.
4. Eckenfelder, W.W. Jr. (1999). Industrial Water Pollution Control. 3/e, McGraw-Hill, New York.
5. Lin, S.D. (2014). Water and wastewater calculations manual. McGraw-Hill.
6. Metcalf & Eddy Inc. Revised by Tchobanoglous, G., Burton, F.L. and Stensel, H.D. (2003). Wastewater Engineering Treatment and Reuse 4/e. Tata McGraw-Hill, New Delhi.
7. Pollution Control Acts, Rules and Notifications issued thereafter, (2021), 7/e, Central Pollution Control Board, Delhi
8. Qasim, S.R. (2017). Wastewater treatment plants: planning, design, and operation. Routledge.
9. Peavy, H.S., Rowe, D.R. and Tchobanoglous, G. (2017). Environmental Engineering. McGraw-Hill, Singapore.
10. Rao, C.S. (2018). Environmental pollution control engineering. New Age International.
11. Rao, M.N. and Rao, H.V.N. (2017). Air Pollution. Tata McGraw, New Delhi.

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Environmental Impact Assessment
Subject Code: ODEPM114T
(Semester- I)

Time: 03Hours **Max.Marks:100Marks**

InternalAssessment:30Marks

EndTerm:70Marks

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3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section A

1. **Concept and Process of EIA:**Introduction, definition, function and purpose of EIA. Evolution and history of EIA in India and the world.Types and limitations ofEIA. Process of EIA – screening, scoping, setting, analysis, and mitigation. Preparation of environmental base map andclassification of environmental parameters.Public participation in EIA.

Section B

2. **Methodologies of EIA:** Criteria for selecting EIA methodology, Impact assessment methods (Adhoc, checklist, matrices, overlays, networking,environmental index methods).
3. **Case studies:**Wildlife Act (1972), Water (Prevention and Control of Pollution) Act (1974), Air (Prevention and Control of Pollution) Act 1981, Environmental Protection Act (EPA) 1986, Hazardous Waste Handling Rules, 1989 and Amendments.

Section C

4. **Prediction and Assessment of Impact:**Impact prediction and assessment of impacts on soil, water (ground and surface water), air, and noise environments. Prediction and assessment of socio-economic and human health impacts. Assessment of the effects of development activities on vegetation and wildlife, the environmental impact of deforestation, causes, and effects of deforestation.
5. **Environmental Risk Assessment (ERA):**Introduction to ERA, Risk assessment and treatment of uncertainty. Steps in performing an ERA, Advantages, and limitations of Environmental Risk Assessment. Risk management in EIA.

Section D

6. **Environmental Management System**: (EMS): Environmental Management System (EMS) scope and objectives. ISO 14000-Background, the ISO 14000 series. ISO 14001 &elements of EMS-environmental policy, planning, implementation, and operation checking & correction action and management review.
7. **Environmental Auditing:** Scope and objectives, procedures, benefits, environmental auditing as a management tool. Concept of eco labelling, ecological and carbon footprints (ISO 14064-65).

References:

1. Canter, L., Bay, H. TX, EIA Press (2015), Cumulative effects assessment and management: principles, processes andpractices, Taylor and Francis Group,Oxfordshire United Kingdom.
2. Hanna, K. (2022). Routledge Handbook of Environmental Impact Assessment, Routledge,London.
3. James T. Maughan, (2012). Environmental Impact Analysis Process and Methods,CRC Press,Boca Raton.
4. Morris, P.,Therivel, R., Therivel, R. and Wood G. (2018). Methods of Environmental and Social Impact Assessment, Routledge,England, UK.