



DEPARTMENT OF ENVIRONMENTAL SCIENCE & ENGINEERING

**SYLLABI AND SCHEME OF EXAMINATION FOR UNDERGRADUATE
PROGRAMME FOR UTD
(CBCS-LOCF as per NEP-2020)**



**WITH EFFECT FROM
THE
SESSION 2024-25**

**GURU JAMBHESHWAR UNIVERSITY OF SCIENCE &
TECHNOLOGY, HISAR(HARYANA)
(A+ NAAC Accredited State Govt. University)**



Guru Jambheshwar University of Science and Technology
Hisar-125001, Haryana



**SYLLABI AND SCHEME OF EXAMINATION FOR UNDERGRADUATE
PROGRAMME FOR UTD**

According to National Education Policy-2020

(w.e.f. Session 2024-25)

SUBJECT: ENVIRONMENTAL SCIENCE

Type of Course	Seme ster	Course Code	Nomenclature of Multidisciplinary Course (MDC) @ 3 credits	Credi ts	Conta ct Hours	Interna l Marks	Extern al Marks	Total Mark s	Duration of Exam (Hrs.)
Multidisciplinary Course (MDC)	I	24MDC0115T	Disaster Management	3	3	25	50	75	2.5
	II	24MDC0215T	Environmental Laws	3	3	25	50	75	2.5
Type of Course	Seme ster	Course Code	Nomenclature of Skill Enhancement Course (SEC) @ 3 credits	Credi ts	Conta ct Hours	Interna l Marks	Extern al Marks	Total Mark s	Duration of Exam (Hrs.)
Skill Enhancement Course (SEC)	I	24SEC0115T	Waste to Energy	3	3	25	50	75	2.5
	II	24SEC0215T	Solid Waste Management	3	3	25	50	75	2.5
	III	24SEC0315T	Ecotechnology	3	3	25	50	75	2.5
Type of Course	Seme ster	Course Code	Nomenclature of Value added Course (VAC) @ 2 credits	Credi ts	Conta ct Hours	Interna l Marks	Extern al Marks	Total Mark s	Duration of Exam (Hrs.)
Value Added Courses (VAC)	I	24VAC0101T	Environmental Studies-I*	2	2	15	35	50	2
	II	24VAC0101T	Environmental Studies-I*	2	2	15	35	50	2
	III	24VAC0301T	Environmental Studies-II*	2	2	15	35	50	2
	IV	24VAC0301T	Environmental Studies-II*	2	2	15	35	50	2

*Environmental Studies-I and Environmental Studies-II must be studied as compulsory paper as per Hon'ble Supreme court directions under MC Mehta Vs Union of India entitled as 860 of 1991 and UGC guidelines for compulsory subject of Environmental Studies-I (Semester I/II) and Environmental Studies-II (Semester III/IV).

Amph

Programme Outcomes

- PO1** Sound knowledge of the basic concepts of Environment and its components along with their interactions through study of Ecology, Biodiversity, Environmental Chemistry, Sustainable Development, and Environmental Microbiology.
- PO2** Understanding different types of Pollution and their sources through study of Climate and Air Pollution Studies, Hazardous Waste, Environmental Toxicology and Soil Pollution and different laws about pollution.
- PO3** Basic knowledge about analysis of pollution using Environmental Analytical and Computational Techniques
- PO4** Understanding different technologies like water and Wastewater treatment technology to find solutions and their applications in abatement of pollution and other environmental problems.
- PO5** Use of different tools for the management of Environment, Energy resources, solid wastes and Biodiversity conservation, Disaster management.
- PO6** Prediction the environmental impacts due to different developmental projects and find solution to eliminate these impacts.



Multidisciplinary Course (MDC)

Disaster Management

Course Code: 24MDC0115T

Credits: 3

Time: 2.5 Hours

Maximum Marks: 75

Internal Marks: 25

External Marks: 50

Note: The examiner is required to set 7 questions in all. The first question will be compulsory consisting of 5 short questions covering the entire syllabus having 2.5 marks each. In addition to this, 6 more questions (each question may be of 2-3 parts) will be set consisting of 2 questions from each unit.

The student is required to attempt 4 questions in all selecting 1 question from each unit including compulsory question no. 1. All questions will carry equal marks.

Course Outcomes (CO): After completing this course, the learner will be able to:

CO1. To have basic conceptual understanding of disasters.

CO2. To understand the causes, types and impacts of natural disasters.

CO3. To understand the different types of manmade disasters and their effects.

CO4. To build skills to respond to disaster and to understand the prevention, preparedness and mitigation for disaster.

Unit-I

Introduction to disaster: Definition, difference between hazard and disaster, understanding natural and manmade disasters, risk and vulnerability in disaster, causes of disaster. Disaster prone areas in India: Areas prone to floods and droughts, Landslides and Avalanches, Areas prone to cyclonic and coastal hazards with special reference to Tsunami.

Unit-II

Natural disaster: Earthquake- causes, types and impacts; Floods- types and impacts; landslides- responsible factors, causes and effects; drought: different types of droughts- meteorological, agricultural, hydrological and effects; cyclone and hurricanes; tsunamis: reasons and its impacts.

Anthropogenic disaster: Types, causes and effects of technological hazards- Industrial hazards, Structural collapse, Power outage, Fire (building fire and forest fire), CBRN: Chemical disasters, biological disasters, Radiological disaster, Nuclear disasters, Sociological hazards- Crime, Terrorism, War.

Unit-III

Disaster Preparedness and mitigation: Definition, Disaster management cycle of earthquake, floods, drought, landslides and cyclone: prevention, preparation and mitigation, Disaster Information, Disaster Response: Disaster Rehabilitation, Reconstruction and Recovery. Role of National Disaster Management Authority (NDMA).

Suggested Readings:

1. Singh V., Aleya L., Singh M., and Singh K.K. (2010). Natural Disaster, APH Publishing Corporation New Delhi.
2. Sahni P., Dhamija A. and Medury U. (2011). Disaster Mitigation: Experiences and Reflections, PHI..
3. Pandey, M. (2014). Disaster Management, Wiley India Pvt. Ltd.
4. Rajan C.K. and Pandharinath N. (2009) Earth and Atmospheric Disaster Management: Nature and Manmade S Publication, Hyderabad.
5. Sharma S.C. (2021). Disaster Management, Khanna Publishing House, 2021.
6. Murthy D.B.N. (2019). Disaster Management. Deep and Deep Publication PVT.Ltd. New Delhi.

Mapping of CO's with PO's

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	M	S	M	S
CO2	S	S	M	S	M	S
CO3	S	S	M	M	M	S
CO4	S	S	M	S	S	S

S=Strong, M=Medium, W=Weak

Multidisciplinary Course (MDC)

Environmental Laws

Course Code: 24MDC0215T

Credits: 3

Time: 2.5 Hours

Maximum Marks: 75

Internal Marks: 25

External Marks: 50

Note: The examiner is required to set 7 questions in all. The first question will be compulsory consisting of 5 short questions covering the entire syllabus having 2.5 marks each. In addition to this, 6 more questions (each question may be of 2-3 parts) will be set consisting of 2 questions from each unit.

The student is required to attempt 4 questions in all selecting 1 question from each unit including compulsory question no. 1. All questions will carry equal marks.

Course Outcomes (CO): After completing this course, the learner will be able to:

CO1. Understand international environment initiative

CO2. Learner will be able to understand Earth summit and sustainable development

CO3. Ability to understand pollution control legislations

CO4. Learner will be able to understand various acts and rules related to environment protection

Unit-I

International environmental initiatives: The Stockholm Declaration, Earth Summit, World Summit on Sustainable Development, Rio+20

Unit-II

Pollution control through legislation in India with special reference to the Water Prevention and Control of Pollution Act, 1974; The Air (Prevention and Control of Pollution) Act, 1981; The Environment Protection Act, 1986,

Unit-III

Wildlife Protection Act, 1972; Plastic Waste Management Rules, 2016; E-Waste Management Rules, 2016; Schemes and programs of Government- Swachhh Bharat Abhiyaan.

Suggested Readings:

1. Land – Use and Environment – S.M. Mujtava
2. Environmental Administration and Law- Paras Diwan.

Mapping of CO's with PO's

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	S	M	M	S
CO2	S	M	M	M	S	M
CO3	M	S	M	M	M	S
CO4	S	M	S	M	S	S

S=Strong, M=Medium, W=Weak

Dr. P. L.

Skill Enhancement Course (SEC)

Waste to Energy

Course Code – 24SEC0115T

Credits 3

Time: 2.5 Hours

Maximum Marks: 75

Internal Marks: 25

External Marks: 50

Note: The examiner is required to set 7 questions in all. The first question will be compulsory consisting of 5 short questions covering the entire syllabus having 2.5 marks each. In addition to this, 6 more questions (each question may be of 2-3 parts) will be set consisting of 2 questions from each unit.

The student is required to attempt 4 questions in all selecting 1 question from each unit including compulsory question no. 1. All questions will carry equal marks.

Course Outcomes (CO): After completing this course, the learner will be able to:

CO1. Understand Energy from Waste and its classification

CO2. Energy conversion technologies

CO3. Explain Biochemical conversion and anaerobic digestion

CO4. Concept of biogas generation and biogas plants

Unit-I

Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

Unit-II

Techniques and product of biomass pyrolysis, incineration, and gasification

Unit-III

Biochemical conversion & anaerobic digestion, Concept of biogas generation, types of biogas plants-applications, Urban waste to energy conversion - Biomass energy programme in India.

Suggested Readings:

1. Non-Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Handbook - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
3. Food, Feed and Fuel from Biomass, Chahal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
4. Biomass Conversion and Technology, C. Y. Wereko-Brobby and E. B. Hagan, John Wiley & Sons, 1996.

Mapping of CO's with PO's

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	S	S	S	S
CO2	M	S	M	S	S	S
CO3	M	M	M	S	S	S
CO4	M	M	M	S	S	S

S=Strong, M=Medium, W=Weak



Skill Enhancement Course (SEC)

Solid Waste Management

Course Code : 24SEC0215T

Credits: 3

Time: 2.5 Hours

Maximum Marks: 75

Internal Marks: 25

External Marks: 50

Note: The examiner is required to set 7 questions in all. The first question will be compulsory consisting of 5 short questions covering the entire syllabus having 2.5 marks each. In addition to this, 6 more questions (each question may be of 2-3 parts) will be set consisting of 2 questions from each unit.

The student is required to attempt 4 questions in all selecting 1 question from each unit including compulsory question no. 1. All questions will carry equal marks.

Course Outcomes (CO): After completing this course, the learner will be able to:

CO1. Understand various sources of solid wastes.

CO2. Explain solid waste, hospital waste and biomedical waste management and handling rules.

CO3. Describe fly ash management rules sources, classification and hazard communication.

CO4. Understand hazardous waste management, its control and treatment.

Unit-I

Introduction: Types, sources and characteristics of solid waste. Solid waste generation, handling and storage. Collection of solid waste

Unit-II

Treatment and disposal of solid waste: Component separation, incineration, pyrolysis, landfilling. biogas plant, fly ash utilization.

Unit-III

Solid waste management. An overview, reduction, reuse and recovery. Solid waste management plan, waste treatment and disposal

Suggested Readings:

1. Solid Waste Management Manual CPCB, New Delhi
2. Ecotechnology for Pollution Control and Environmental Management by Trivedy R.K. and Arvind Kumar
3. Basic Environmental Technology Nathanson, J.A.

Mapping of CO's with PO's

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	M	M	S	S
CO2	S	M	M	S	S	S
CO3	S	M	M	S	S	S
CO4	S	S	S	S	S	S

S=Strong, M=Medium, W=Weak



Skill Enhancement Course (SEC)

Ecotechnology

Course Code : 24SEC0315T

Credits: 3

Time: 2.5 Hours

Maximum Marks: 75

Internal Marks: 25

External Marks: 50

Note: The examiner is required to set 7 questions in all. The first question will be compulsory consisting of 5 short questions covering the entire syllabus having 2.5 marks each. In addition to this, 6 more questions (each question may be of 2-3 parts) will be set consisting of 2 questions from each unit.

The student is required to attempt 4 questions in all selecting 1 question from each unit including compulsory question no. 1. All questions will carry equal marks.

Course Outcomes (CO): After completing this course, the learner will be able to:

CO1. Understand basic concepts to ecosystems and ecotechnological approaches.

CO2. Recognize wetland ecosystem its significance, importance and applications.

CO3. Explain reclamation of pollutes sites using phytoremediation approach and treatment of wastewater by bioremediation.

CO4. Understand the restoration of degraded ecosystems using ecological approaches.

Unit-I

Basic concepts of ecosystem dynamics, ecotechnological approaches, applications of ecotechnology for societal welfare and sustainable development.

Unit-II

Wetland ecosystems-ecological significance, Concept of constructed wetlands

Unit-III

Decontamination of polluted sites, In-situ and ex-situ bioremediation techniques, phytoremediation technology, Restoration of degraded ecosystems using ecological approach, soil fertility management, Vermicomposting

Suggested readings:

1. Mitsch, W.J. and Jorgensen, S.E. 1989. Ecological Engineering: An Introduction to Ecotechnology John Wiley & Sons, New York.
2. Kadlec, R.H., Knight, R.L. 1986. Treatment Wetlands Lewis Publishers, Boca Raton, FL.

Mapping of CO's with PO's

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	S	S	S	S
CO2	M	S	M	S	S	S
CO3	M	M	M	S	S	S
CO4	M	M	M	S	S	S

S=Strong, M=Medium, W=Weak

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Value Added Course (VAC)

Environmental Studies-I

Course Code : 24VAC0101T

Credit: 2

Time: 2 Hours

Maximum Marks: 50

Internal Marks: 15

External Marks: 35

Note: The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus having 3 marks each. In addition to this, four more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit.

The student/candidate is required to attempt three questions in all selecting one question from each unit consisting of 10 marks each including compulsory Question No. 1.

Course Outcomes (CO): After completing this course, the learner will be able to:

CO1. Understand the concept of environmental studies, and ecosystem.

CO2. Learn about the biodiversity and its conservation.

CO3. Know about the types of pollution, solid waste management.

Unit-I

The multidisciplinary nature of environmental studies, Definition, scope and importance, Need for public awareness. Ecosystems: Structure and function. Producers, consumers and decomposers. Energy flow in the ecosystem, Ecological succession · Food chains, food webs and ecological pyramids.

Unit-II

Biodiversity and its conservation: Introduction –Biogeographical classification of India; Value of biodiversity: India as a mega-diversity nation; Hot-spots of biodiversity; Threats to biodiversity: Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Suggested Readings:

1. Kaushik, A & Kaushik, C.P. 2022. Perspectives in Environmental Studies. New Age International Pvt Ltd, New Delhi.
2. Bharucha, E. 2021. A Textbook of Environmental Studies for Undergraduate Courses, Orient Blackswan Pvt Ltd.
3. Goswami, P., Mandal, J. & Singh, S. 2022. A Textbook on Environmental Studies, Ashok book stall, Assam.
4. Joshi, P.C. & Joshi, N. 2009. A Text Book of Environmental Science. APH Publishing Corporation.
5. Basu, M. & Xavier Savarimuthu, S.J. 2017. Fundamentals of Environmental Studies. Cambridge University Press.
6. Singh, R.P. & Islam, Z. 2012. Environmental Studies. Concept Publishing Company.

Mapping of CO's with PO's

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	S	M	M	S
CO2	S	S	M	S	M	S
CO3	M	S	M	S	S	S

S=Strong, M=Medium, W=Weak

Value Added Course (VAC)
Environmental Studies-II

Course Code: 24VAC0301T
Credit: 2
Time: 2 Hours

Maximum Marks: 50
Internal Marks: 15
External Marks: 35

Note: The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus having 3 marks each. In addition to this, four more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit.

The student/candidate is required to attempt three questions in all selecting one question from each unit consisting of 10 marks each including compulsory Question No. 1.

Course Outcomes (CO): After completing this course, the learner will be able to:

- CO1. Understand the concept of Natural Resources
- CO2. Learn about the Social Issues and the Environment.
- CO3. Know about the environmental law and legislation.
- CO4. Know about the human population and the environment.

Unit-I

Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems. Forest, Water, Mineral, Food, Energy, and Land Resources, Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

Environmental Pollution Definition Causes, effects and control measures of: a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear pollution; Solid waste management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution, Pollution case studies.

Unit-II

Social Issues and the Environment, Environmental Protection Act; Air (Prevention and Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislation, Human Population and the Environment: Population growth, variation among nations; Population explosion – Family Welfare Programmes; Environment and human health; Human Rights; Value Education; HIV / AIDS; Women and Child Welfare; Role of Information Technology in Environment and Human Health; Case Studies

Suggested Readings:

1. Kaushik, A & Kaushik, C.P. 2022. Perspectives in Environmental Studies. New Age International Pvt Ltd, New Delhi.
2. Bharucha, E. 2021. A Textbook of Environmental Studies for Undergraduate Courses, Orient Blackswan Pvt Ltd.
3. Goswami, P., Mandal, J. & Singh, S. 2022. A Textbook on Environmental Studies, Ashok book stall, Assam.
4. Joshi, P.C. & Joshi, N. 2009. A Text Book of Environmental Science. APH Publishing Corporation.
5. Basu, M. & Xavier Savarimuthu, S.J. 2017. Fundamentals of Environmental Studies. Cambridge University Press.
6. Singh, R.P. & Islam, Z. 2012. Environmental Studies. Concept Publishing Company.

Mapping of CO's and PO's

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	S	M	M	S
CO2	S	S	M	S	M	S
CO3	M	S	M	S	S	S
CO4	S	S	S	S	S	S

S=Strong, M=Medium, W=Weak

