



UNIVERSITY OF JAMMU

(NAAC ACCREDITED 'A' GRADE' UNIVERSITY)
Baba Sahib Ambedkar Road, Jammu-180006 (J&K)

Academic Section

Email: academicsectionju14@gmail.com

NOTIFICATION (22/Sept./Adp/41)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation of the approval of the Academic Council, is pleased to authorize the adoption of the Syllabi and Courses of Study in the subject of **Environmental Science (Skill Enhancement Course)** of Semesters **Ist, IInd** and **IIIrd** for **Four Year Under Graduate Programme** under the **Choice Based Credit System** as per **NEP-2020 (as given in the annexure)** for the examinations to be held in the years as per the details given below:

Subject	Semester	for the examination to be held in the years
Environmental Science (SEC)	Semester-I	December 2022, 2023 and 2024
	Semester-II	May 2023, 2024 and 2025
	Semester-III	December 2023, 2024 and 2025

The Syllabi of the courses are available on the University website: www.jammuuniversity.ac.in

Sd/-
DEAN ACADEMIC AFFAIRS

No. F. Acd/II/22/6609-6686

Dated: 27-09-2022

Copy for information and necessary action to:

1. Special Secretary to the Vice-Chancellor, University of Jammu for information of Hon'ble Vice-Chancellor
2. Dean, Faculty of Science
3. HOD/Convener, Board of Studies in **Environmental Science**
4. Sr. P.A. to the Controller of Examinations
5. All members of the Board of Studies
6. Confidential Assistant to the Controller of Examinations
7. I/C Director, Computer Centre, University of Jammu
8. Deputy Registrar/Asst. Registrar (Conf. /Exams. UG/ Exam Eval Non-Prof/CDC)
9. Incharge, University Website for Uploading of the notification.

Sumita Sharma
27/9/22
Deputy Registrar (Academic)
Deep
26/9/22

University of Jammu
Syllabus of Environmental Sciences at FYUP under CBCS as per NEP-2020
Skill Enhancement Course

First (Ist) Semester

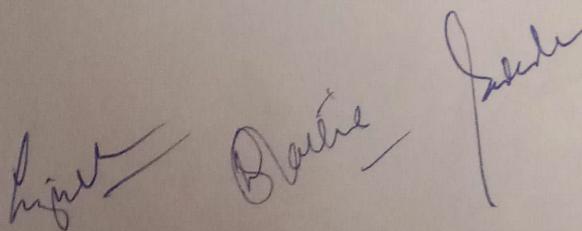
S. No.	Course Type	Course No.	Course Title	Credits	Marks		Total Marks
					Theory		
1.	Skill Enhancement Course	USEEST 101	Solid Waste Management	2	Mid semester: 10 Marks	End Exam: 40 Marks	50

Second (IInd) Semester

S. No.	Course Type	Course No.	Course Title	Credits	Marks		Total Marks
					Theory		
1.	Skill Enhancement Course	USEEST 201	Liquid Waste Management	2	Mid semester: 10 Marks	End Exam: 40 Marks	50

Third (IIIrd) Semester

S. No.	Course Type	Course No.	Course Title	Credits	Marks		Total Marks
					Theory		
1.	Skill Enhancement Course	USEEST 301	Green Technologies	2	Mid semester: 10 Marks	End Exam: 40 Marks	50



University of Jammu

Syllabi of Environmental Sciences at FYUP under CBCS as per NEP-2020

Semester – I

(Examination to be held December 2022, 2023, 2024)

Skill Enhancement Course

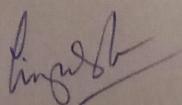
Course Code: USEEST101

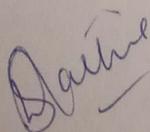
Course Title: Solid Waste Management

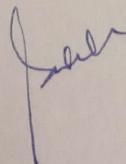
Credits: 2

Contact Hours: 30

Maximum Marks: 50







First (1st) Semester

S. No.	Course Type	Course No.	Course Title	Credits	Marks		Total Marks
					Theory		
1.	Skill Enhancement Course	USEEST 101	Solid Waste Management	2	Mid semester: 10 Marks	End Exam: 40 Marks	50

Signature

**Syllabus for examination to be held during the years Dec. 2022, 2023 & 2024 under
CBCS as per NEP-2020
Environmental Sciences**

Semester	I	Type	Skill Enhancement Course
Course Title	Solid Waste Management	Course Code	USEEST101
Credits	2	Contact Hours	30
		External Exam	
		Duration of Exam	2.5hrs
		Maximum Marks	40
		Internal Exam (Midterm assessment)	
		Duration of Exam	1.5hrs
		Maximum Marks	10

Objectives

The objective of this course is to acquaint the students with the growing menace of solid waste. This course will help students to understand varied sources of solid waste generation, and their effect on life and ecosystem. Students will have an understanding of various methods of solid waste disposal and conversion of solid waste into useful entities.

UNIT 1: BASIC CONCEPTS AND MANAGEMENT PRACTICES

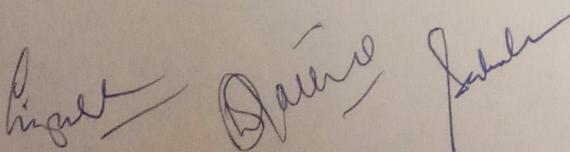
- 1.1 Solid waste: definition and concept, sources and classification of solid waste
- 1.2 Factors affecting the generation of solid waste, impact of solid waste on the environment, human and plant health
- 1.3 Municipal Solid Waste (Management and handling) Rules, 2016
- 1.4 Management of MSW - biodegradable waste: composting, vermi-composting, farmyard manure, biogas production, management of MSW-non biodegradable waste, sanitary-landfills, incineration, pyrolysis and gasification.

UNIT 2: SOLID WASTE COLLECTION AND PROCESSING TECHNIQUES

- 2.1 Handling and segregation of solid waste at source and methods of separation, solid waste reduction technique - reuse and recycle
- 2.2 Collection of solid waste and transfer and transportation of solid waste, solid waste processing methods (storage, conveying, compacting, shredding, pulping, granulating, etc.)
- 2.3 Management of e-waste
- 2.4 Site selection and siting criteria for sanitary landfills

UNIT 3: LAB COURSE

- 3.1 Qualitative and quantitative estimation of solid waste from household/commercial/Institutional areas.
- 3.2 Cost estimation of recyclable waste generated from households/commercial/Institutional areas.
- 3.3 Estimate energy content of household solid waste.
- 3.4 Making recycled paper/paper items from used newspapers/paper.
- 3.5 Preparation and collection of items from recycled/reused material.
- 3.6 Laboratory demonstration of vermicomposting.
- 3.7 Laboratory demonstration of aerobic composting.
- 3.8 Field visits to waste dumping/disposal site.
- 3.9 Field visits to solid liquid resource management (SLRM).
- 3.10 Field visit to various industries.
- 3.11 Field visit to paper recycling unit or any other recycling unit.
- 3.12 Field visit to plastic recycling unit or any other recycling unit.
- 3.13 Construction and working of incinerators/biogas plants.
- 3.14 Site selection and siting criteria for sanitary landfills in your area.



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Environmental Sciences**

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Course Title	Solid Waste Management	Course Code	USEEST101
Credits	2	Contact Hours	30
		External Exam	
		Duration of Exam	2.5hrs
		Maximum Marks	40
		Internal Exam (Midterm assessment)	
		Duration of Exam	1.5hrs
		Maximum Marks	10

LITERATURE RECOMMENDED

1. Anonymous (2014). Waste to resources - A waste management Handbook. The Energy and Resources Institute (TERI) New Delhi. www.teriin.org.
2. Bhatia S.C. (2007). Solid and hazardous waste management, Atlantic Publishers and Distributions (P). New Delhi
3. Khan, I. H. and Ahsan, N. (2011). Textbook of Solid Waste Management. CBS Publishers, New Delhi
4. Mishra, S.G. and Mani D. (1993). Pollution through solid waste. Ashok Publishing House, New Delhi.
5. Tchobanoglous, G. and Kreith, F. (2002). Handbook of Solid Waste Management: Mc Graw Hill Handbooks, New York.
6. Zhu, D.; Asnani, P.U.; Zurbrigg, C.; Anapolsky, S. and Mani, S. (2008). Improving solid waste management in India. The world Bank Washington D.C. www.worldbank.org.

NOTE FOR PAPER SETTING

The paper shall be of 50 marks comprising 10 marks for Mid Semester Assessment and 40 marks for End-Semester Examination. The responsibility of conducting and evaluating the Mid Semester Assessment is vested on the teacher designated as Course Coordinator. The End-Semester Examination shall be conducted by the concerned University. End-Semester Examination will consist of two sections in question paper with the pattern as follows:
Section-A will consist of four (4) short answer questions representing all units/syllabi i.e. at least one question from each unit. Each question shall be of 2.5 marks (**All compulsory**).
Section-B will consist of six (6) long answer questions (**Three to be attempted, one from each unit**) representing whole of the syllabi i.e. two questions from each unit. Each question shall be of 10 marks.

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University of Jammu

Syllabi of Environmental Sciences at FYUP under CBCS as per NEP-2020

Semester – II

(Examination to be held May 2023, 2024, 2025)

Skill Enhancement Course

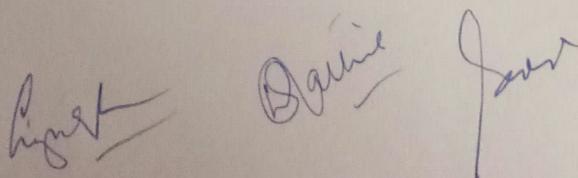
Course Code: USEEST201

Course Title: Liquid Waste Management

Credits: 2

Contact Hours: 30

Maximum Marks: 50



Second (IInd) Semester

S. No.	Course Type	Course No.	Course Title	Credits	Marks		Total Marks
					Theory		
1.	Skill Enhancement Course	USEEST 201	Liquid Waste Management	2	Mid semester: 10 Marks	End Exam: 40 Marks	50

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Syllabus for examination to be held during the years May 2023, 2024 & 2025 under
CBCS as per NEP-2020
Environmental Sciences

Semester	II	Type	Skill Enhancement Course
Course Title	Liquid Waste Management	Course Code	USEEST201
Credits	2	Contact Hours	30
		External Exam	
		Duration of Exam	2.5hrs
		Maximum Marks	40
		Internal Exam (Midterm assessment)	
		Duration of Exam	1.5hrs
		Maximum Marks	10

Objectives

Being limited and elixir of life on earth, water is widely treated as infinite and expendable. This course concentrates on polluted water which makes its way into rivers and lakes and ultimately into plants, animals and humans. It will also educate students on various wastewater treatment methods and the necessity of reusing water.

UNIT 1: INTRODUCTION TO LIQUID WASTES

- 1.1 Water as a resource and its significance on planet earth
- 1.2 Water pollution: types, sources and impacts; surface water, groundwater pollution. wastewater: domestic black & grey water; industrial wastewater
- 1.3 pH, hardness, dissolved oxygen, biochemical oxygen demand, chemical oxygen demand, trace contaminants, biological examination of water
- 1.4 Characteristics of industrial wastewater, types of industrial pollutants, list of green, orange and red industries
- 1.5 Contaminants in groundwater

UNIT 2: WASTEWATER TREATMENT AND REUSE

- 2.1 Wastewater treatment: primary treatment, pre-treatment: screening, grit removal, flow equalization, sedimentation, secondary treatment: chemical unit processes: precipitation, coagulation, disinfection
- 2.2 Secondary treatment: biological unit processes: aerobic process - activated sludge system, trickling filters, anaerobic process - CSTR (continuous stirred tank reactors), anaerobic filters, UASB (upflow anaerobic sludge blanket technology)
- 2.3 Oxidation pond process design, advanced techniques: membrane filtration, gas stripping, ion exchange, advanced oxidation process
- 2.4 Tertiary treatment, concepts and treatment of wastewater with aquatic macrophytes, thin film techniques for wastewater treatment using aquatic plants, algal treatment systems,
- 2.5 Water reclamation and reuse: water reclamation technologies, public health and environmental issues in water reuse, risk assessment for water reuse.

UNIT 3: LAB COURSE

- 3.1 Determination of solids in water.
- 3.2 Determination of turbidity of water.
- 3.3 Determination of alkalinity (carbonates and bicarbonates) of water.
- 3.4 Determination of hardness of water by EDTA titrimetric method.
- 3.5 Determination of pH of water.
- 3.6 Determination of chloride in water.
- 3.7 Determination of dissolved oxygen in water.
- 3.8 Determination of B.O.D. of wastewater sample

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**CBCS as per NEP-2020
Environmental Sciences**

Semester	II	Type	Skill Enhancement Course
Course Title	Liquid Waste Management	Course Code	USEEST201
Credits	2	Contact Hours	30
		External Exam Duration of Exam Maximum Marks	2.5hrs 40
		Internal Exam (Midterm assessment) Duration of Exam Maximum Marks	1.5hrs 10

LITERATURE RECOMMENDED

1. Tchobanoglous, G. and Burton, F.L. (1979). Waste water engineering: Treatment, Disposal, and Reuse. Tata McGraw Hill, New Delhi.
2. Garg, S. K. (2003) Sewage Disposal and Air Pollution Engineering, Khanna Publishers, Delhi.
3. Manual of Water Supply and Treatment (1999). Central Public Health and Environmental Engineering Organisation, Ministry of Urban Development, New Delhi.
4. Manual on Sewerage and Sewage Treatment (1993). Central Public Health and Environmental Engineering Organisation, Ministry of Urban Development, New Delhi.
5. McGhee, T. J. (1991). Water Supply and Sewerage. McGraw-Hill, New York.
6. Metcalf & Eddy Inc. Revised by Tchobanoglous, G., Burton, F. L. and Stensel, H. D. (2002). Wastewater Engineering Treatment and Reuse 4/e. Tata McGraw-Hill Publishing Company Limited, New Delhi.
7. Eckenfelder, W. W. Jr. (1989). Industrial Water Pollution Control. McGraw-Hill Book Company, New York.
8. Nemerow, N. L. (1978). Industrial Water Pollution: Origin, Characteristics and Treatment. Addison- Wesley Publishing Company, New York.
9. Pollution Control Acts, Rules and Notifications Issued Thereunder (2001) Pollution Control Law Series, PCLS/02/1002, 4th Edition, Central Pollution Control Board, Delhi.
10. Qasim, S. R. (1999). Wastewater Treatment Plant: Planning, Design and Operation. Lancaster Technomic, New York.
11. Willig, J. T. (Ed.) (1994). Environmental TQM. McGraw-Hill, Inc. New York.

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University of Jammu

Syllabi of Environmental Sciences at FYUP under CBCS as per NEP-2020

Semester – III

(Examination to be held December 2023, 2024, 2025)

Skill Enhancement Course

Course Code: USEEST301

Course Title: Green Technologies

Credits: 2

Contact Hours: 30

Maximum Marks: 50

Dr. Dinesh Jaiswal

Third (IIIrd) Semester

. No.	Course Type	Course No.	Course Title	Credits	Marks		Total Marks
					Theory		
1.	Skill Enhancement Course	USEEST 301	Green Technologies	2	Mid semester: 10 Marks	End Exam: 40 Marks	50

Signature

Syllabus for examination to be held during the years Dec. 2023, 2024 & 2025 under
CBCS as per NEP-2020
Environmental Sciences

Semester	III	Type	Skill Enhancement Course
Course Title	Green Technologies	Course Code	USEEST301
Credits	2	Contact Hours	30
		External Exam	
		Duration of Exam	2.5hrs
		Maximum Marks	40
		Internal Exam (Midterm assessment)	
		Duration of Exam	1.5hrs
		Maximum Marks	10

Objectives

This course focuses on the use of sustainable technology to reduce human impact on the environment. It will teach students how small changes in lifestyle can bring a large term impact.

UNIT 1: GREEN TECHNOLOGY AND GREEN INFRASTRUCTURE

- 1.1 Definition and concept: green technology, green energy, green infrastructure, green economy, green chemistry
- 1.2 Sustainable consumption of resources, R's approach, energy conservation
- 1.3 Green buildings, need and relevance of green buildings over conventional buildings, green planning, landuse planning
- 1.4 Concepts of green cities, waste reduction, green belts, CNG fuelled public transport
- 1.5 Eco-mark certification: importance and implementation

UNIT 2: GREEN CHEMISTRY, APPLICATION OF GREEN TECHNOLOGY AND SUSTAINABLE FUTURE

- 2.1 Introduction, principles and recognition of green criteria, green products: biodegradable products and bioaccumulative products
- 2.2 ISO 14000, green nanotechnology, UNEP's green economy initiative
- 2.3 Greenhouse gas emission reduction, carbon capture and storage technologies, pollution reduction and removal: flue gas desulphurisation, catalytic converters
- 2.4 Major challenges and their resolution in implementation of green technology
- 2.5 Successful green technologies: wind turbines, solar panels, etc., green practices to conserve natural resources: organic agriculture, agroforestry, etc.

UNIT 3: LAB COURSE

- 3.1 Prepare a report on eco-friendly products being used in your area.
- 3.2 Visit to industrial units to observe the use of green technology.
- 3.3 To prepare a model of an ideal green building.
- 3.4 To prepare a working model of solar panel or windmill.

LITERATURE RECOMMENDED

1. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2006. Environmental and Pollution Science. Elsevier Academic Press.
2. Purohit, S.S. & Ranjan, R. 2007. Ecology, Environment & Pollution. Agrobios Publications.
3. Vesilind, P.J., Peirce, J.J. & Weiner R.F. 1990. Environmental Pollution and Control. Butterworth-Heinemann, USA.
4. Park, K. 2015. Park's Textbook of Preventive and Social Medicine (23rd Ed.). Banarsidas Bhanot Publishers.

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Syllabus for examination to be held during the years Dec. 2023, 2024 & 2025 under
CBCS as per NEP-2020
Environmental Sciences

Semester	III	Type	Skill Enhancement Course
Course Title	Green Technologies	Course Code	USEEST301
Credits	2	Contact Hours	30
		External Exam Duration of Exam	2.5hrs
		Maximum Marks	40
		Internal Exam (Midterm assessment)	
		Duration of Exam	1.5hrs
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