SHARDA UNIVERSITY
Beyond Boundaries

NAAC A+ ACCREDITED

SHARDA SCHOOL OF ENGINEERING & SCIENCE

COURSE

INNOVATIVE STRATEGIES FOR WASTE REDUCTION, RECYCLING, AND MANAGEMENT

(NV62001)

VALUE ADDED
COURSE BROCHURE-30 HRS
2025-26

ABOUT THE UNIVERSITY

Sharda University is a leading Educational institution based out of Greater Noida, Delhi NCR. A venture of the renowned Sharda Group of Institutions (SGI), The University has established itself as a high quality education provider with prime focus on holistic learning and imbibing competitive abilities in students.

ABOUT SCHOOL

Sharda School of Engineering and technology is an open platform for diverse voices where teaching runs parallel to the real world and students are groomed to join the global workforce. SSET is distinguished as one of the top-ranked engineering schools in India. The students at SSET benefit through the professional grooming of renowned faculty and industry experts having experience of tackling pressing engineering problems. Students discover their passion in one of the various offered Engineering majors at the School of Engineering and technology. A student-centric pedagogy, project-based approach and design-driven curriculum provide students with an inclination for complex problem solving, design, innovation, and a passion for learning. The mission of the School of Engineering and technology through its various programmes are to educate well-integrated individuals who possess technical and social competence to succeed in professional arenas and design solutions for global problems.

ABOUT DEPARTMENT

Department of Civil Engineering (CE) is one of the premier departments of School of Engineering and Technology, Sharda University. The department offers B.Tech, M.Tech and Ph.D. Programmes. The department has people of eminence from academia as well as industry, who have exposure to future cutting – edge research programs in the field of Hydraulics, Environmental Engineering, Geotechnical Engineering, Structural Engineering, Transportation Engineering, Geodesy & Mapping, Geographic Information System & Remote Sensing and Global Positioning Systems.

ABOUT COURSE

INNOVATIVE STRATEGIES FOR WASTE REDUCTION, RECYCLING, AND MANAGEMENT

This comprehensive course equips students with practical skills and industry-relevant knowledge in modern waste management practices. The program covers solid waste policy, types, sources, and generation patterns, along with advanced treatment and management techniques. Students will gain hands-on experience in waste collection systems design, biological and thermal treatment methods, recycling processes, and sustainable disposal practices. The course emphasizes real-world applications through site visits and projects, preparing students to develop innovative, sustainable solid waste management systems that integrate advanced treatment methods and comply with legal frameworks.

Course Schedule

Week	Topic	Duration Hrs.
1	Nature and characteristics of solid wastes, Quantities, Rates of generation, factors affecting them	3
2	Generation, on-site storage, Collection, separation, processing and On-site storage methods	3
3	Methods and technologies for solid waste collection, route optimization, scheduling, and equipment	3
4	Transportation logistics, Processing and Pre-treatment Technologies: sorting, shredding, baling	3
5	Biological Treatment: Recycling methods, Aerobic methods - Composting, vermicomposting	3
6	Anaerobic methods: Biomethanation process, Mechanical-Biological Treatment, Bio-drying	3
7	Thermal Technique: Chemical oxidation methods, waste to energy concept and RDF	3
8	Pyrolysis and Gasification methods, Incineration and Energy recovery system	3
9	Disposal of Solid Wastes: Landfills classification, citing criteria, design and maintenance	3
10	Management of Biomedical, Nuclear, Electronic, Industrial wastes, Various acts and regulations in India	3

RESOURCE PERSON

Ms. Sphurty Raman

Ms. Sphurty Raman is presently working as an Assistant Professor in the Department of Civil Engineering at Sharda School of Engineering & Science, Sharda University. She brings diverse industry and academic experience, having worked for 2 years at Shailendra Sharma and Architects firm focusing on MPBDC projects, and 1.5 years with a construction firm in Indore. She has submitted her Ph.D. thesis in Structural Engineering from NIT Bhopal with a CGPA of 8.81, and completed her M.Tech in Structural Engineering from NIT Bhopal with First Division Honours (CGPA 8.55). She has published multiple research papers in high-impact SCIE-indexed international journals, SCOPUS-indexed book chapters, and conference proceedings. Her research expertise includes sustainable construction materials, concrete technology, statistical optimization using Taguchi method and ANOVA, and AI/ML applications in civil engineering. She is proficient in STAAD Pro, AutoCAD, and has completed professional certifications in AI applications for civil engineering.

CO and PO Mapping

Cos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	-	2	2	2	-	-	3	-	-	2	-	3	1	-	1
CO2	-	2	1	-	-	-	2	-	-	1	-	2	-	-	1
CO3	2	2	1	-	-	-	2	-	-	1	-	2	-	-	1
CO4	1	3	3	-	-	-	2	-	-	3	2	2	-	-	1
CO5	-	3	3	-	-	-	2	-	-	3	2	2	-	-	1
Co6	2	3	3	2			2			3	2	3	1		1

School : SSCSE	**Batch: 2025-2029**
Programme : B. Tech	**Current Academic Year: 2025-26**
Branch : CE	**Semester: II**

1. Course Code	NV62001
2. Course Title	Innovative Strategies for Waste Reduction, Recycling, and Management
3. Credits	Non-Credit
4. Contact Hours (L-T-P)	30 Hours
Course Type	Value added course
5. Course Objective	The objective of this course is to put the understanding into practice, changing our unsustainable ways into more sustainable ones. The aim of sustainable development is to balance economic, environmental and social needs, allowing prosperity for now and future generations.
6. Course Outcomes	CO1: Identify and categorize the various sources and types of solid waste. CO2: Understand the principles and processes involved in the collection,transportation, and processing of solid wastes. CO3: Apply biological treatment techniques such as composting and anaerobic digestion to manage biodegradable waste. CO4: Analyse the efficiency and environmental impacts of various thermal treatment methods. CO5: Develop a comprehensive waste disposal plan adhering to legal frameworks and sustainable practices. CO6: Design innovative, sustainable solid waste management systems integrating advanced treatment and disposal methods.
7. Course Description	This course will cover 1) Solid waste policy, and types and amounts. 2) Solid waste treatment and management: The technical design of waste systems; source separation; waste collection and transport; landfilling; incineration; biochemical conversion methods; excursion to solid waste treatment. 3) Materials recycling from waste: Background, system design, and examples. 4) Various acts, rules and regulations in India for waste. the management of Solid

8. Outline syllabus		**Duration Hours**
Unit 1	**Solid wastes-Sources and generation**	
A	Nature and characteristics, Quantities, Rates of generation, factors affecting them.	CO1
B	Generation, on-site storage.	
C	Collection, separation, processing and on-site storage methods containers.	
Unit 2	**Solid Waste Collection and Processing Systems**	
A	Methods and technologies used for solid waste collection, route optimization, scheduling, and equipment to ensure efficiency	CO2
B	Transportation logistics, fuel efficiency, and environmental impacts of waste transport and strategies to minimize transportation costs and emissions.	
C	Processing and Pre-treatment Technologies: sorting processes to recover recyclables and reduce waste volumes. Techniques such as shredding, baling, and compaction to prepare waste for further treatment.	
Unit 3	**Biological Treatment of Solid Waste Management**	
A	Recycling methods, Aerobic methods: Composting,vermicomposting	CO3
B	Anaerobic methods: Biomethanation process	
C	Mechanical-Biological Treatment, Bio-drying and Fermentation	
Unit 4	**Thermal Technique for Solid Waste Management**	
A	Chemical oxidation methods, waste to energy concept and RDF	CO4
B	Pyrolysis and Gasification methods	
C	Incineration and Energy recovery system	
Unit 5	**Disposal of Solid Wastes and Disposal Rules**	
A	Final disposal of solid wastes and residual matters: Landfills: its classification, citing criteria, design and maintenance	CO5
B	Management of Biomedical, Nuclear, Electronic, Industrial, and construction & demolition solid wastes, Leachate treatment	
C	Various acts, rules and regulations in India for the,management of Solid waste	
Mode of Examination	Assignment/ Quiz/ Viva	

Weightage Distribution	**CA**	**MTE**	**ETE**
	25%	**25%**	**25%**

Text book/s*	**1.** Tchobanoglous, George; Theisen, Hilary; Vigil, Samuel "Integrated Solid Waste Management: Engineering Principles and Management Issues" 2nd Edition, TMH **2.** Michael D. LaGrega, Philip L. Buckingham, Jeffery C. Evans, HAZARDOUS WASTE MANAGEMENT Second Edition, TMH
Other References	**1.** McBean, Rovers & Farquhar "Solid Waste Landfill Engineering and Design" Prentice Hall **2.** Mackenzie L. Davis, and David A. "INTRODUCTION TO ENVIRONMENTAL ENGINEERING" Fourth Edition, TMH