

		National Institute of Technology Meghalaya An Institute of National Importance							CURRICULUM	
Programme		Master of Technology					Year of Regulation		2025	
Department		Civil Engineering					Semester		II	
Course Code	Course Name	Pre-requisite	Credit Structure				Marks Distribution			
			L	T	P	C	INT	MID	END	Total
CE 534	Advanced Waste Management Systems	NIL	3	0	0	3	50	50	100	200
Course Objectives	- To gain insight into the collection, transfer, and transport of municipal solid waste. - To understand the design and operation of a municipal solid waste land - To Understand the design and operation of a resource recovery facility. - To Understand the design and operation of a waste-to-energy facility.		Course Outcomes	CO1	Able to learn basic concepts of solid waste management, beginning from source generation to waste disposal					
				CO2	Able to describe the functional components of solid waste management system					
				CO3	Able to understand the processes involved in solid and hazardous waste management					
				CO4	Able to identify the most common techniques for preventing, minimizing, recycling, disposing and treatment of waste and their application on site remediation					
				CO5	Able to understand the principles of existing and emerging technologies for the treatment of waste and recovery of value from wastes.					
SYLLABUS										
No.	Content							Hours	COs	
I	Introduction: Day-day solid waste management and social issues, scope and importance of solid waste management, classification and magnitude of the problem, functional elements. Solid Waste: Sources of generation, classifications, characterization and quantification, municipal industrial and bio-medical waste, estimation of moisture content and density of a solid waste, design examples							9	CO1, CO2, CO3	
II	Transfer and Transport: Collection services and collections systems, collection equipment, transfer stations, collection route optimization. Processing Techniques: Processing methodologies and waste minimization, recovery, recycle and reuse (3R) of materials from solid waste, volume and size reduction, biological processing.							9	CO3, CO4, CO5, CO6	
III	Treatment Methodologies: Composing- aerobic and aerobic process, incineration, pyrolysis and energy recovery. Disposal: Significance of refuse disposal and management, impact of open land dumping site selection, sanitary land, filing, design criteria and design examples. Leachate and gas collection system leachate treatment.							9		
IV	Hazardous waste: Identification of Hazardous waste, classification, treatment and disposal techniques – biomedical, radioactive and chemical industries.							7		
V	Recent Developments in applied sectors: Power generation, energy recovery, blending with construction materials, governmental, non-governmental activities and roles under solid waste management.							8		
Total Hours								42		
Essential Readings										
1. A. D. Buekens and C. H. Huang, Waste Management: Current Issues and Future Challenges, 2nd ed. London, UK: CRC Press, 2023.										
2. A. Kumar and S. M. Tareq, <i>Circular Economy in Municipal Solid Waste Management: A Global Perspective</i> , 1st ed. Singapore: Springer, 2023. doi: 10.1007/978-981-99-0531-6										
3. J. D. Graham and L. W. Boyd, <i>Green and Sustainable Waste Management: Advances, Trends, and Challenges</i> , 1st ed. Amsterdam, Netherlands: Elsevier, 2024.										
Supplementary Readings										
1. K. Thirugnanasambandham and M. Govindarajan, Waste Management: Concepts, Methodologies, Tools, and Applications, 1st ed. Hershey, PA, USA: IGI Global, 2021.										
2. R. Ghosh, P. Ghosh, and A. Sharma, Sustainable Waste Management: Policies and Case Studies, 1st ed. Singapore: Springer, 2022. doi: 10.1007/978-981-19-2854-4										
3. CPHEEO, Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organization, Government of India, New Delhi, 2000										