

Course Type	Course Code	Name of the Course	L	T	P	Credits
DP	NESC510	Integrated Solid Waste Management Practical	0	0	3	1.5

Course Objectives

To enable students to perform experiments related to physical, biological, and thermochemical characterization of solid waste.

Overall Learning Outcomes

Upon successful completion of this course, students will be able to:

- At the end of the experimental exercise, students will be able to perform field-oriented testing of various solid wastes.
- The student will also develop knowledge to design the relevant waste treatment/recovery facility for the extraction of valuable end products from the wastes.

Unit No.	Topics to be covered	Practical Hr (P)	Learning outcomes
I	Segregation of municipal solid waste and its quantification	3	Students will get an idea of the composition present and its quantity in the given residential/municipal wastes
II	Proximate Analysis 1: to determine the moisture and volatiles of the solid wastes	3	The outcome of this will help to understand the thermal properties of the wastes
III	Proximate Analysis 2: to determine the ash and fixed carbon of the solid wastes	3	The outcome of this will help to understand the thermal properties of the wastes
IV	Determination of the Total Carbon content of the solid wastes	3	This helps students to design suitable waste-to-energy conversion technology.
V	Densification of the solid wastes using a pelletizer	3	Help to understand the increase in energy content and volume reduction of pelletized waste
VI	Ultimate Analysis of solid wastes using elemental Analyzer	3	This helps students design suitable waste-to-energy conversion technology
VII	To Determine the Calorific value of solid waste sample using a bomb calorimeter	3	This helps students design suitable waste-to-energy conversion technology
VIII	Determination of Total Available Nitrogen of the solid waste sample	3	Students will develop knowledge about the composting and AD potential of waste.
IX	To determine the Field Capacity of the soil sample	3	This experiment helps to give basic idea for landfill design.
X	Determination of Phosphorus content of the solid wastes	3	Students will develop knowledge for designing biological processes for decomposition of waste
XI	Study of pyrolysis kinetics of the solid wastes using a thermogravimetric analyzer	3	To understand the pyrolysis kinetics of the wastes to design the reactors for conversion.
XII	Analysis of biological composition analysis using Soxhlet equipment part I: Cellulose extraction	3	This helps then to extract cellulose, the most important component from biomass economically.
XIII	Practice & Review	6	To enhance the knowledge and assess the progress.
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Reference book:

1. Tchobanoglous, G., Theisen, H., & Vigil, S. A. (2014). Integrated Solid Waste Management: Engineering Principles and Management Issues. New Delhi: McGraw-Hill Education (India) Private Limited.
2. Tchobanoglous, G., & Kreith, F. (2002). Handbook of Solid Waste Management-Second Edition. New York: McGraw-Hill.