

PRE-REQUISITES: ENSC-203**LEARNING OUTCOMES**

Upon completion of the course, students will be able to:

- Analyze a solid waste stream for its composition and properties
- Describe the processes involved in collection, transport, processing and disposal of waste
- Identify the waste management options from reduce to final disposal
- Identify the hazardous waste components

CONTENTS

The present course will cover the basic aspects of solid waste management including overview of waste management, characteristics of waste and functional elements of waste management from waste generation to final disposal.

Unit-1: Introduction to Solid Waste Management

- 1.1. Definition of solid waste and Solid Waste Management
- 1.2. Types of solid waste
- 1.3. Properties of solid waste (Physical and chemical characteristics of solid waste)
- 1.4. Environmental and health impacts of solid waste
- 1.5. Their generation, Disposal and treatment
- 1.6. Six functional elements of Solid Waste Management (Generation, Storage, Collection, Transfer and Transport, Processing, Handling, Disposal)

Unit-2: Processing Techniques of Solid Waste

- 2.1. Mechanical Volume Reduction (Compaction)
- 2.2. Chemical Volume Reduction (Incineration)
- 2.3. Mechanical Size Reduction (Shredding)
- 2.4. Component Separation (Recycling)
- 2.5. Drying and dewatering (Moisture reduction)

Unit-3: Biological Treatment

- 1.1. Biogas
- 1.2. Composting techniques

Unit-4: Final Disposal

- 4.1. Landfilling and its types
- 4.2. Applications of landfilling

TEACHING – LEARNING STRATEGIES

- Lecture based examination
- Presentation/seminars
- Class discussion
- Quizzes

ASSIGNMENTS – TYPE AND NUMBER WITH CALENDAR

It is continuous assessment. The weightage of Assignments will be 25% before and after midterm assessment. It includes:

- Classroom participation,
- Attendance, assignments and presentation,
- Homework
- Attitude and behavior,
- Hands-on-activities,
- Short tests, quizzes etc.

ASSESSMENT AND EXAMINATIONS:

Sr. No.	Elements	Weightage	Details
1.	Mid Term Assessment	35%	It takes place at the mid-point of the semester
2.	Formative Assessment	25%	It is continuous assessment. It includes: classroom participation, attendance, assignments and presentation, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

RECOMMENDED TEXT BOOKS / SUGGESTED READINGS

1. Rao, M. N., Sultana, R., Kota, S. H., Shah, A., & Davergave, N. (2016). *Solid and hazardous waste management: science and engineering*. Butterworth-Heinemann.
2. Rajaram, V., Siddiqui, F. Z., Agrawal, S., & Khan, M. E. (2016). *Solid and liquid waste management waste to wealth: Solid and liquid waste management waste to wealth*. PHI Learning Pvt. Ltd.
3. Wong, J. W., Surampalli, R. Y., Zhang, T. C., Tyagi, R. D., & Selvam, A. (Eds.). (2016, January). *Sustainable solid waste management*. Reston, VA: American Society of Civil Engineers.
4. Chang, N. B., & Pires, A. (2015). *Sustainable solid waste management: a systems engineering approach*. John Wiley & Sons.
5. Khan, I. H., & Ahsan, N. (2003). Textbook of solid waste management. *Satish Kumar Jain for CBS Publisher and Distributors, New Delhi, 608p.*