Course Type	Course Code	Name of the Course	L	T	P	Credits
DE	NESD510	Biomedical and Hazardous Waste Management	3	0	0	3

Course Objectives

- ToUnderstanding the concept of biomedical and hazardous wastes.
- Understanding basics of the treatment of hazardous wastes.
- Insight of regulatory framework related to hazardous waste management.

Learning Outcomes

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

- Understandthe concept of biomedical and hazardous wastes and their treatment strategies.
- Understand the principles of regulatory framework for the treatment and disposal of hazardous wastes.

Unit No.	Topics to be covered	Lecture Hours	Learning outcomes
1.	Biomedical Waste: categorization, generation, collection, transport, treatment and disposal, Infectious Waste, segregation processes, color coding and types of containers for segregation processes of biomedical waste, Biomedical waste management.	8	To understand the basics concept of biomedical waste management.
2.	Hazardous Waste Treatment: waste reduction, neutralization, Incineration, combustion and Pyrolysis, unit operations, supply air, products of combustion, furnace temperature, furnace calculation, and environmental control, disposal. Precautions in collection, reception, treatment, transport, storage, and disposal, and import procedure for environmental surveillance.	9	To understand the concept of various treatments methods of Hazardous waste.
3.	Hazardous Chemicals: Toxic chemicals, flammable chemicals, pesticides, explosives, reactive substances, Cyanide wastes, water-soluble chemical compounds of heavy metals, & toxic metals. Hydrocarbons, point pigment dyes, oil emulsion tars, phenols, asbestos, acid/alkaline slurry, Physical properties, and chemical composition and lethal dose and concentration on human life flora and fauna. Storage, collection, transport.	9	To understand the toxicity and treatment aspects of hazardous chemicals.
4.	HWM, Regulatory framework, Basal Convention and other international statistics, monitoring of critical parameters/provide risk- analysis. HAZON, HAZOP, Consequence Analysis. Emergency Management: Indian and foreign legislation in respect of the above. Case studies, leakage, explosion, oil spills and fire of hazardous chemical storage. Leakage in atomic reactor plants.	8	To understand the regulatory guidelines of the hazardous waste management.
5.	Radioactive wastes generated during mining, processing of atomic minerals, and in atomic reactors, and disposal of spent fuel rods. Treatment and disposal; remediation of contaminated sites. E-Waste: recovery of useful materials from e-waste, treatment of e-waste.	8	To understand the concept and treatments of radioactive waste.
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Text Books:

1. Brunner, C. R. (1989). Hazardous waste incineration. John Wiley & Sons.
2. Dawson, G. W., & Mercer, B. W. (1989) Hazardous waste management. John Wiley & Sons.

Reference books:

1. WastewaterLudwig, C., Hellweg, S., & Stucki, S. (2012). Municipal solid waste management: strategies and technologies for sustainable solutions. Springer Science & Business Media.
2. Green, A. E. S. Medical waste incineration and pollution prevention. A. E. S. Green (1992.). New York: Van Nostrand Reinhold.