

Course syllabus

Department of Civil Engineering, Indian Institute of Technology Madras

CE6015 - Solid Waste Management

Credit Distribution: C:9 L:0 T:0 P:0 E:0 O: TH:0

Course Type: Theory

Description: To introduce the concepts and fundamentals of integrated solid waste management To teach how to plan and design a sustainable solid waste management system Expected Outcome: A thorough understanding about the theory and practice of Solid Waste Management.

Course Content: Introduction: History and development of solid waste management, legislations and regulations, issues in solid waste management, resource management, waste minimization: Reduce, Recycle, Reuse Sources and Types of Solid Waste: Residential, commercial and industrial wastes (including hazardous waste), waste generation, sampling and analysis. Factors determining the quantity and composition of solid wastes Collection and Transport: waste logistics, collection services, transfer, transportation systems, analysis of collection system, separate collection, route optimization, transfer and transport, organizational aspects, waste fees Processing and Material Separation Techniques: Receiving Area, Conveyors, Shredders, manual separation, screening, air classification and magnetic and eddy current separation techniques, sensor systems for separation Mechanical biological treatment such as composting, anaerobic digestion etc.: Basics, processes, dimensioning, technologies, emissions and emission control, product quality and marketing of products, building aspects, Incineration, pyrolyzation and gasification, Hydrogenation and hydrolysis, (basics, processes, dimensioning, technologies, emissions and emission control, ash management, product quality and marketing of products, building aspects, Management of Electronic waste, Biomedical waste, and nuclear Disposal of Solid Waste: Siting, types of landfills, landfill concepts, Design and construction, gas, leachate collection and treatment), layers, storm water movement and control, natural attenuation and containment landfills, operation, closure of landfills, environmental monitoring. Waste Recycling (paper, glass, plastics, metals, wood, packaging): Process fundamentals, processing methods, Marketing recycled products Waste Avoidance: Basic requirements of waste avoidance, Waste avoidance options at home, avoidance of production waste Cost considerations for waste processing facilities, Planning procedures and Integrated waste management concepts Environmental impact of SWM systems, LCA, Environmental aspects of SWM systems regarding climate change, substitution of raw materials and fossil carbon etc. Overview of solid waste management practices in India and elsewhere

Text Books

- Tchobanoglous, G., Theisen, H., and Vigil, S.A. Integrated Solid Waste Management, McGraw Hills, 1993.
- Vesilin, P.A., Worrell,W.A.,and Reinhart,D.R. Solid Waste Engineering, C L Engineering, 2001.
- Cheremisnoff, N. D. , "Handbook of Solid Waste Management and Waste Minimization Technologies Butterworth, London, 2003
- Bilitewski, B., Hardtle, G.Marek, K., Weissbach, A., Boeddicker, H. "Waste Managemnet" Springer, 1997.

Reference Books

- CPHEEO Manual of Solid Waste Management, GOI Publication, 2001
- Manuals, Rules and regulations in India for Municipal Solid Waste, Biomedical waste, fly ash, nuclear waste, hazardous waste and E-waste, Government of India.

Prerequisite: NIL