



Introduction to Solid Waste Management

1.5 academic hours twice a week, 3 credits, Undergraduate.

Overview:

In the twentieth century, due to industrial revolution and technology development, consumption patterns of the people, all over the globe, have changed. The use of natural resources and goods has increased manifold. Due to this, huge quantities of different types of solid wastes are produced every day, creating an alarming problem of their disposal. It is now recognized that proactive management is required to deal with this problem, i.e., it is required to reduce the generation of solid waste, effective collection of solid waste and utilization of solid waste rather than concentrating on disposal alone. Thus, solid waste management involves management of activities associated with generation, storage, collection, transfer and transport, reuse and recycling, processing and disposal which should be environmentally compatible, adopting to the principles of economy, aesthetics, and energy conservation.

Specific Goals

1. Waste Generation. The student should be able to identify the physical, chemical and biological characteristics of Municipal Solid Waste (MSW), including: density, energy and moisture characteristics.
2. Storage. The student should be able to calculate, storage requirement for MSW including; container size, truck size, available materials.
3. Collection. The student should be able to differentiate between variable collection systems.
4. Transfer and Transport. The student will be able to calculate the economics and design of transfer station including: preliminary design of the transfer station, truck movement, compaction and recycling.
5. Processing and Recovery. The student will become familiar with processing and recovery techniques: separation techniques, incineration and composting.
6. Disposal. The student should be able to integrate the previous steps into the design of a sanitary landfill including: waste disposal, cover materials, landfilling method, gas control and leachate control.

Course Requirements

The course will include one/two mandatory full-day field trips, worksheets, exercises, readings, etc. In addition to participating in class discussions and field trips, students will have a midterm exam and a final exam. The main reading of this course will be provided by the instructor.

Grade components:

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- Attendance, participation, discussions 15%
- Quizzes, Assignments, readings 25%
- Midterm exam 5%
- Field Trip and reports 15%
- Final exam 40%

Schedule

Lesson	Topics
1.	Introduction, Definition, Hierarchy of Waste Management
2.	Evolution of Solid Waste Management, Legislative Trends and Impacts <i>Readings: Pp 1.1 – 1.11 George Tchobanoglous, Frank Kreith: Handbook of Solid Waste Management, Second Edition, McGRAW-HILL: New York 2002.</i>
3.	- Sources, Composition, and Properties of Solid Waste - Physical, Chemical and Biological Properties of MSW Readings will be provided by the instructor.
4.	Sources, Types and Properties of Household Hazardous Wastes
5.	Disposal of Solid Wastes and Residual Matter <i>Readings will be provided by the instructor.</i>
6.	Disposal of Solid Wastes and Residual Matter
7.	Waste Handling and Separation, Storage and Processing at the Source <i>Readings will be provided by the instructor.</i>
8.	Guest lecture by: Dr Shmuel Bernner The integrated approach to waste treatment
9.	Collection Routes, Management of Collection Systems. Readings: Pp 7.22 – 7.27 George Tchobanoglous, Frank Kreith: Handbook of Solid Waste Management, Second Edition, McGRAW-HILL: New York 2002.
10.	Separation and Processing and Transformation of Solid Waste
11.	Transfer and Transport
12.	Solid Waste Generation and Collection Rates
13.	From waste to Biogas Lab work
14.	Principles of composting, hands on
15.	Field trip to Nimra SW site
16.	Composting of Municipal Solid Wastes I Readings: Pp 12.1 – 12.14 George Tchobanoglous, Frank Kreith: Handbook of Solid Waste Management, Second Edition, McGRAW-HILL: New York 2002.
17.	Composting of Municipal Solid Wastes II Readings will be provided by the instructor.
18.	From waste to Biogas data presentation
19.	Overview of Recycling
20.	Development and Implementation of Materials Recovery Facilities Readings: Pp 8.70 – 8.77 George Tchobanoglous, Frank Kreith: Handbook of Solid Waste Management, Second Edition, McGRAW-HILL: New York 2002.
21.	Waste-to-Energy Combustion Introduction Readings: Pp 13.3 – 9.11 George Tchobanoglous, Frank Kreith: Handbook of Solid Waste Management, Second Edition, McGRAW-HILL: New York 2002.
22.	Waste-to-Energy Combustion
23.	Landfill Method design, location and Management
24.	Landfill Method of Solid Waste Disposal
25.	Review

Text Book:

George Tchobanoglous, Frank Kreith: Handbook of Solid Waste Management, Second Edition, McGRAW-HILL: New York 2002.

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