Introduction to Solid Waste Management

Lecturer: Dr. Jawad A.H Shoqeir
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.

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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:

- Attendance, participation, discussions 20%
- Quizzes, Assignments, readings 20%
- Midterm exam 10%
- Field Trip and reports 10%
- Final exam 40%

Schedule

Lesson	Date	Topics
1.		Introduction, Definition, Hierarchy of Waste Management Readings: Pp 1.1 – 1.11 George Tchobanoglous, Frank Kreith: Handbook of Solid Waste Management, Second Edition, McGRAW-HILL: New York 2002.
2.		Evolution of Solid Waste Management, Legislative Trends and Impacts
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 Readings will be provided by the instructor.
6.		Disposal of Solid Wastes and Residual Matter
7.		Solid Waste Generation and Collection Rates
8.		Waste Handling and Separation, Storage and Processing at the Source Readings will be provided by the instructor.
9.		Collection of Solid Waste, The Logistics of Solid Waste Collection
10.		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.
11.		Separation and Processing and Transformation of Solid Waste
12.		Transfer and Transport
13.		Composting of Municipal Solid Wastes Readings: Pp 12.1 – 12.14 George Tchobanoglous, Frank Kreith: Handbook of Solid Waste Management, Second Edition, McGRAW-HILL: New York 2002.
14.		Overview of Recycling
15.		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.
16.		Recycling Markets Readings: Pp 9.1 – 9.16

		George Tchobanoglous, Frank Kreith: Handbook of Solid Waste Management, Second Edition, McGRAW-HILL: New York 2002.
17.		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.
18.		Special Wastes
19.		Composting of Municipal Solid Wastes
20.		Waste-to-Energy Combustion
21.		Landfill Method of Solid Waste Disposal
22.		Financing and Life-Cycle Costing of Solid Waste Management Systems Readings will be provided by the instructor.
23.	????	A tentative field trip to Ramat Hovav and Arad SW site.
24.		Final exam

Text Book:

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