ENE 486 Design of Solid and Hazardous Waste Engineering Systems 3 Units

USC | SONNY ASTANI DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

ABET Course Syllabus

Course Information, Textbook and Supplementary Materials

Design Kernel

Course Description: Engineering design of solid and hazardous waste facilities such as waste minimization, secured landfill, and hazardous waste treatment.

Design Kernel for: ENE Environmental **Required for:** BSENE

Prerequisites: ENE 400 Environmental Engineering Principles and CE 473 Engineering Law, Finance and Ethics

Co-Requisite: None

Required Textbooks:

1. Bagchi, A., Design of Landfills and Integrated Solid Waste Management, Wiley Publishing Co., 3rd Edition (2004).
2. Wong, J., Hong, C., Nolan, G., Design of Remediation Systems, CRC Press (1997).
3. Lu, J., Solid and Hazardous Wastes Engineering, CD-Rom Handouts (2005).

References:

1. Legislation: RCRA, CERCLA/SARA and California State related legislation (current issues).
2. Related Code of Federal Regulations and California Code of Regulations (current issues).
3. Kreith, F. (Editor in Chief), Handbook of Solid Waste Management, McGraw-Hill, New York (1994).
4. Tchobanoglous, O., Theisen, H., and Eliassen, R., Solid Wastes Engineering Principles and Management Issues, McGraw-Hill, New York (1993).
   Theodore, L., Reynolds, J. P., Introduction to Hazardous Incineration, John Wiley, New York (1987).
6. Freeman, H. M., Standard Handbook of Hazardous Waste Treatment and Disposal, McGraw-Hill, New York (1997).
7. Wentz, C. A., Hazardous Waste Management, McGraw-Hill, Inc. (1995).
8. Rossiter, A. P. (Editor), Waste Minimization Through Process Design, McGraw-Hill, New York (1995).
9. Wong, J., Nolan, 0. L., Design of Remediation Systems, Lewis Publishers, Boca Raton, Florida (1997).
10. Berlin, R. E., Stanton, C. C., Radioactive Waste Management, John Wiley, New York (1989).
11. Design cases (provided in the class)

Topics Covered	Learning Outcomes
Introduction to engineering design of solid and hazardous waste facilities	Students will understand the components of solid and hazardous waste; and the principles of design: 1. Waste Definition, Generation, Effects, and Management Options 2. Legislation and Regulations 3. General Siting and Design Criteria 4. Future Trends
Solid Waste Engineering	5. Principles and Design of Transfer and Transport Facilities 6. Principles and Design of Sanitary Landfills 7. Principles and Design of Material Recovery Facilities 8. Types and principles of energy conversion processes 9. Principles and Design of Waste Minimization Facilities 10. Principles and Design of Hazardous Waste Landfills 11. Principles and Design of Hazardous Waste Storage Facilities 12. Principles and Design of Thermal Treatment Facilities 13. Principles and Design of Chemical/Physical/Biological Treatment Facilities 14. Principles and Design of Site remediation Facilities 15. Principles and Design of Radioactive Waste Treatment/Site Remediation Facilities

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Lecture and Lab Schedule			
Lecture		**Lab**	
Sessions per Week	Duration per Session	Sessions per Week	Duration per Session
1	3 hours		

Relation of Course Objectives to Program Outcomes

The Civil Engineering program is designed to teach beyond the technical content of the curriculum and prepare the students to utilize what they learn in a professional setting.

This course contributes to the program outcomes as outlined in the adjacent table.

Course Contribution to Program Outcomes *(a-k)*	✓ Key
c. An ability to design a system component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	✓

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