

**STATE UNIVERSITY OF NEW YORK
COLLEGE OF TECHNOLOGY
CANTON, NEW YORK**



MASTER SYLLABUS

**COURSE NUMBER – COURSE NAME
CONS 485 – Solid Waste Management**

Created by: Adrienne C. Rygel

Updated by: Adrienne C. Rygel

Canino School of Engineering Technology

Department: Civil and Construction Technology

Semester/Year: Fall 2018

A. **TITLE:** Solid Waste Management

B. **COURSE NUMBER:** CONS 485

C. **CREDIT HOURS:** (Hours of Lecture, Laboratory, Recitation, Tutorial, Activity)

Credit Hours: 3

Lecture Hours: 3 per week

Lab Hours: per week

Other: per week

Course Length: 15 Weeks

D. **WRITING INTENSIVE COURSE:** Yes No

E. **GER CATEGORY:** None: Yes: GER
If course satisfies more than one: GER

F. **SEMESTER(S) OFFERED:** Fall Spring Fall & Spring

G. **COURSE DESCRIPTION:**

This course will introduce students to the governing, management, science, and engineering that impacts solid waste. The role of the federal government in the management of municipal solid waste is discussed, in conjunction with state solid waste legislation. Different types of solid waste streams (e.g. household waste, construction and demolition waste) and their characteristics will be examined. Students learn how to plan municipal solid waste management programs. A significant portion of the course will be spent on solid waste landfill engineering and design (e.g. liner systems, covers, leachate collection and treatment systems, groundwater flow and monitoring, gas migration and collection). Construction and operational principles of landfills are discussed. Opportunities for reduction, reuse, and recycling of solid waste are discussed as one solid waste management technique.

H. **PRE-REQUISITES:** None Yes If yes, list below:

CONS 385 (Hydrology and Hydrogeology) and CONS 216 (Soils and Foundations); or permission from the instructor

CO-REQUISITES: None Yes If yes, list below:

I. STUDENT LEARNING OUTCOMES: (see key below)

By the end of this course, the student will be able to:

<u>Course Student Learning Outcome</u> <u>[SLO]</u>	<u>Program Student Learning Outcome</u> <u>[PSLO]</u>	<u>GER</u> <i>[If Applicable]</i>	<u>ISLO & SUBSETS</u>	
1. Conduct mass balance analyses of contaminant migration in landfills	2488: 1a, 2ab, 6b		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
2. Design landfill cover systems	2488: 1a, 4b		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
3. Design landfill liner systems	2488: 1a, 4b		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
4. Design leachate collection and treatment systems technology problem	2488: 1a, 4b		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
5. Design landfill gas collection and recovery systems	2488: 1a, 4b		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
6. Design groundwater monitoring systems	2488: 1a, 4b		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets

7. Prepare groundwater monitoring programs	2488: 1a, 4b		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
8. Interpret solid waste regulations	2488: 1a		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets

KEY	<u>Institutional Student Learning Outcomes [ISLO 1 – 5]</u>
ISLO #	ISLO & Subsets
1	Communication Skills Oral [O], Written [W]
2	Critical Thinking <i>Critical Analysis [CA] , Inquiry & Analysis [IA] , Problem Solving [PS]</i>
3	Foundational Skills <i>Information Management [IM], Quantitative Lit./Reasoning [QTR]</i>
4	Social Responsibility <i>Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T]</i>
5	Industry, Professional, Discipline Specific Knowledge and Skills

*Include program objectives if applicable. Please consult with Program Coordinator

J. **APPLIED LEARNING COMPONENT:** Yes No

If YES, select one or more of the following categories:

- | | |
|---|--|
| <input checked="" type="checkbox"/> Classroom/Lab | <input type="checkbox"/> Civic Engagement |
| <input type="checkbox"/> Internship | <input type="checkbox"/> Creative Works/Senior Project |
| <input type="checkbox"/> Clinical Placement | <input type="checkbox"/> Research |
| <input type="checkbox"/> Practicum | <input type="checkbox"/> Entrepreneurship |
| <input type="checkbox"/> Service Learning | (program, class, project) |
| <input type="checkbox"/> Community Service | |

K. **TEXTS:**

McBean, Edward A., Rovers, Frank A., and Farquhar, Grahame J. (1995). Solid Waste Landfill Engineering and Design. Upper Saddle River, New Jersey: Prentice Hall PTR.

L. **REFERENCES:**

- Shah, Kanti L. (2000). Basics of Solid and Hazardous Waste Management Technology. Upper Saddle River, New Jersey: Pearson Prentice Hall.
- Tchobanoglous, George and Kreith, Frank (2002). Handbook of Solid Waste Management, 2nd edition. New York, New York: McGraw Hill.
- McCarthy, David F. (2007). Essentials of Soil Mechanics and Foundations: Basic Geotechnics, 7th edition. Upper Saddle River, New Jersey: Pearson Prentice Hall.
- Coduto, Conald P. (1999). Geotechnical Engineering: Principles and Practice, 1st edition. Upper Saddle River, New Jersey: Pearson Prentice Hall.

M. **EQUIPMENT:** None Needed:

N. **GRADING METHOD:** A-F

O. **SUGGESTED MEASUREMENT CRITERIA/METHODS:**

- Examinations,
- Homework assignments,
- In-class exercises,
- Quizzes

P. **DETAILED COURSE OUTLINE:**

- I. Introduction
- II. Regulations Related to Solid Waste Management
 - A. Federal Regulations
 - B. New York State Regulations
- III. Composition of Solid Waste
- IV. Site-Selection for Solid Waste Facilities
- V. Principles of Decomposition in Landfills
- VI. Mass Balance Computational Procedures in Landfill Assessment

- VII. **Water Balance Modeling For a Landfill**
- VIII. **Landfill Design**
 - A. **Covers**
 - B. **Liner Systems and Barriers**
 - C. **Leachate Collection and Treatment Systems**
 - D. **Landfill Gas Migration, Collection, and Recovery**
 - E. **Groundwater Monitoring Systems**
 - F. **Design for Natural Attenuation**
- IX. **Landfill Construction and Operation**
 - A. **Cell Consturction and Operation**
 - B. **Cover Materials and Frequency of Application**
 - C. **Prevention of Precipitation Run-On**
 - D. **Operational Control Considerations**
 - E. **Site Life Span**
 - F. **Site Operations and Control (e.g. odor, noise)**
- X. **Monitoring Programs**
 - A. **Groundwater monitoring and regulation requirements**
 - B. **Leachate monitoring and regulation requirements**
 - C. **Gas monitoring and regulation requirements**
- XI. **Reduction Opportunities**
 - A. **Reuse**
 - B. **Recycling**
 - C. **Composting**

Q. **LABORATORY OUTLINE:** None Yes