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:

<table>
<thead>
<tr>
<th>Course Student Learning Outcome [SLO]</th>
<th>Program Student Learning Outcome [PSLO]</th>
<th>GER [If Applicable]</th>
<th>ISLO &amp; SUBSETS</th>
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<tbody>
<tr>
<td>1. Conduct mass balance analyses of contaminant migration in landfills</td>
<td>2488: 1a, 2ab, 6b</td>
<td>5-Ind, Prof, Disc, Know Skills ISLO ISLO</td>
<td>Subsets Subsets Subsets Subsets</td>
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<td>2. Design landfill cover systems</td>
<td>2488: 1a, 4b</td>
<td>5-Ind, Prof, Disc, Know Skills ISLO ISLO</td>
<td>Subsets Subsets Subsets Subsets</td>
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<td>3. Design landfill liner systems</td>
<td>2488: 1a, 4b</td>
<td>5-Ind, Prof, Disc, Know Skills ISLO ISLO</td>
<td>Subsets Subsets Subsets Subsets</td>
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<td>4. Design leachate collection and treatment systems technology problem</td>
<td>2488: 1a, 4b</td>
<td>5-Ind, Prof, Disc, Know Skills ISLO ISLO</td>
<td>Subsets Subsets Subsets Subsets</td>
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<td>5. Design landfill gas collection and recovery systems</td>
<td>2488: 1a, 4b</td>
<td>5-Ind, Prof, Disc, Know Skills ISLO ISLO</td>
<td>Subsets Subsets Subsets Subsets</td>
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<td>6. Design groundwater monitoring systems</td>
<td>2488: 1a, 4b</td>
<td>5-Ind, Prof, Disc, Know Skills ISLO ISLO</td>
<td>Subsets Subsets Subsets Subsets</td>
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<td>7. Prepare groundwater monitoring programs</td>
<td>2488: 1a, 4b</td>
<td>5-Ind, Prof, Disc, Know Skills ISLO ISLO</td>
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<td>8. Interpret solid waste regulations</td>
<td>2488: 1a</td>
<td>5-Ind, Prof, Disc, Know Skills ISLO ISLO</td>
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<td>1</td>
<td>Communication Skills&lt;br&gt;Oral [O], Written [W]</td>
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<td>2</td>
<td>Critical Thinking&lt;br&gt;Critical Analysis [CA], Inquiry &amp; Analysis [IA]&lt;br&gt;Problem&lt;br&gt;Solving [PS]</td>
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<td>Foundational Skills&lt;br&gt;Information Management [IM], Quantitative Lit./Reasoning [QTR]</td>
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<td>4</td>
<td>Social Responsibility&lt;br&gt;Ethical Reasoning [ER], Global Learning [GL]&lt;br&gt;Intercultural Knowledge [IK], Teamwork [T]</td>
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<td>5</td>
<td>Industry, Professional, Discipline Specific Knowledge and Skills</td>
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*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:

☐ Classroom/Lab ☐ Civic Engagement
☐ Internship ☐ Creative Works/Senior Project
☐ Clinical Placement ☐ Research
☐ Practicum ☐ Entrepreneurship
☐ Service Learning (program, class, project)
☐ Community Service

K. **TEXTS:**


L. **REFERENCES:**


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 Construction 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 ☐