**CE 5358: Solid Waste Engineering**

Fall 2015

**Instructor(s):** Melanie Sattler, Ph.D., P.E.



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**Office Hours:** Tues. 1-2:45, W 8:30-12, Th. 1-2:45

**Section Information:** CE 5358 Sec. 002 (on-line) and 003 (in-class)

**Time and Place of Class Meetings:** Nedderman Hall, Room 111, M,W,F 1-1:50

**Description of Course Content:** This course will provide an overview of the various aspects of integrated municipal solid waste management (with the exception of landfilling, covered in CE 5375), including waste generation, characterization, and collection; source reduction and recycling; design of facilities for materials recovery and energy recovery (combustion and anaerobic digesters); life cycle analysis; and current issues in solid waste management. 3 credit hours*.*

**Student Learning Outcomes:** By the end of this course, students should be able to:

1. Explain basic waste management concepts, including waste management hierarchy, integrated waste management, waste characteristics, and sustainability;
2. Assess waste collection and processing systems;
3. Design major components of a waste recovery facility, waste combustion facility, and anaerobic digester;
4. Conduct a life cycle assessment of various waste management options;
5. Reduce environmental impacts of their personal waste management.

**Required Textbooks and Other Course Materials:** *Solid Waste Engineering*, William A. Worrell and P. Aarne Vesilind, Second Ed., Cengage Learning: Stamford, CT, 2012.

**Descriptions of major assignments and examinations:**

|  |  |  |
| --- | --- | --- |
| **Assignment** | **Weighting** | **Due Date** |
| **In-class****(%)** | **Web****(%)** |
| Homework | 25 | 25 | Various due dates |
| Exam #1 (1-1 thru 2-2) | 15 | 16 | 10/2/15 (tentative) |
| Exam #2 (2-3 thru 3-2) | 15 | 17 | 11/13/15 (tentative) |
| Final Exam (3-3 thru 5-3) | 15 | 17 | Mon. Dec. 14, 11-1:30 |
| Attendance/class participation | 5 | N/A | --- |
| Project | 25 | 25 | 12/4/15 |

**Attendance:** At The University of Texas at Arlington, taking attendance is not required. Rather, each faculty member is free to develop his or her own methods of evaluating students’ academic performance, which includes establishing course-specific policies on attendance. As the instructor of this section, I will take attendance, and it will count 5% of the grade.

**Grading**: Grade Assignments:

* 1. A

80-89 B

70-79 C

60-69 D

<60 F

I do not curve. A grade of 78 is a grade of 78, which is a C.

Homework is due at the beginning of class (1:00 p.m.). Homework turned in at the end of class will be counted late (25% off). Written homework will be accepted after the class period in which it is due with penalties as follows: 25% penalty if submitted by the beginning of the next class; 50% if submitted by the beginning of the second class period following the due date. Homework submitted thereafter will not be accepted.

On occasion, short in-class assignments will be given. These will count as part of the students’ homework grade.

Students are expected to keep track of their performance throughout the semester and seek guidance from available sources (including the instructor) if their performance drops below satisfactory levels; see “Student Support Services,” below.

**Make-up Exams**: If a student is going to miss an exam due to travel, the exam must be taken earlier than the assigned date.

**Expectations for Out-of-Class Study**: Beyond the time required to attend each class meeting, students enrolled in this course should expect to spend at least an additional 9 hours per week of their own time in course-related activities, including reading required materials, completing assignments, preparing for exams, etc.

**Grade Grievances**: Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current University Catalog.

**Drop Policy:** Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance**. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (<http://wweb.uta.edu/aao/fao/>).

**Disability Accommodations: UT** Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including *The Americans with Disabilities Act (ADA), The Americans with Disabilities Amendments Act (ADAAA),* and *Section 504 of the Rehabilitation Act.* All instructors at UT Arlington are required by law to provide “reasonable accommodations” to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the instructor with official notification in the form of a letter certified by the **Office for Students with Disabilities (OSD).** Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting:

**The Office for Students with Disabilities, (OSD)** [www.uta.edu/disability](http://www.uta.edu/disability) or calling 817-272-3364.

**Counseling and Psychological Services, (CAPS)** [www.uta.edu/caps/](http://www.uta.edu/caps/) or calling 817-272-3671.

Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at [www.uta.edu/disability](http://www.uta.edu/disability) or by calling the Office for Students with Disabilities at (817) 272-3364.

**Title IX:** *The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit*[*uta.edu/eos*](http://www.uta.edu/hr/eos/index.php)*. For information regarding Title IX, visit* [www.uta.edu/titleIX](http://www.uta.edu/titleIX).

**Academic Integrity:** Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

*I pledge, on my honor, to uphold UT Arlington’s tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.*

*I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.*

UT Arlington faculty members may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents’ Rule* 50101, §2.2, suspected violations of university’s standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student’s suspension or expulsion from the University.

**Electronic Communication:** UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at <http://www.uta.edu/oit/cs/email/mavmail.php>.

**Student Feedback Survey:** At the end of each term, students enrolled in classes categorized as “lecture,” “seminar,” or “laboratory” shall be directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student’s feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington’s effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit <http://www.uta.edu/sfs>.

**Final Review Week:** A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

**Emergency Exit Procedures:** Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit, which is located out the door to the left. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

**Student Support Services**:UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at http://www.uta.edu/universitycollege/resources/index.php

**The English Writing Center (411LIBR)**: Hours are 9 am to 8 pm Mondays-Thursdays, 9 am to 3 pm Fridays and Noon to 5 pm Saturdays and Sundays. Walk In ***Quick Hits*** sessions during all open hours Mon-Thurs. Register and make appointments online at [http://uta.mywconline.com](http://uta.mywconline.com/). Classroom Visits, Workshops, and advanced services for graduate students and faculty are also available. Please see [www.uta.edu/owl](http://www.uta.edu/owl) for detailed information.

**Librarian to Contact:** Gretchen Trkay gtrkay@uta.edu, 817-272-7434

**Course Schedule**

|  |  |  |  |
| --- | --- | --- | --- |
| **Section of Course** | **Unit** | **Week** | **Book Ch.** |
| **1 Introduction to Solid Waste Management** | 1-1 Integrated Solid Waste Management | 1 | 1 |
| 1-2 Source Reduction | 1 | 1-1 |
| 1-3Municipal Solid Waste Generation and Characterization | 2 | 2 |
| 1-4 Waste Collection | 3 | 3 |
|  |
| **2 Materials Recycling and Recovery**  | 2-1 Recycling | 4 | 1-2-3 |
| 2-2 Waste Processing for Recovery | 4 | 5 |
| 2-3 Materials Separation for Recovery | 5-6 | 6 |
|  |
| **3 Energy Recovery Technologies** | 3-1 Solid Waste Incinerators/Combustors | 7-8 | 7 |
| 3-2 Anaerobic Digesters | 9-10 | 8-1 |
| 3-3 Landfill Gas to Energy Options  | 11 | 4-3-3 |
| 3-4 Pyrolysis | 11 | N/A |
|  |  |
| 1. **Evaluating Sustainability: Life Cycle Assessment**
 | 4-1 Introduction to Sustainability  | 12 | 9-1 |
| * 1. Life Cycle Assessment Introduction
 | 12-14 | N/A |
| * 1. Life Cycle Assessment Software
 |  |  |
|  |
| **5 Current Issues in Solid Waste Management** | 5-1 Greenhouse Gas, Odors and Air Pollutant Emissions | 15 | N/A |
| 5-2 Special Waste Categories: Hazardous Materials and Medical Waste | 15 | 9-6 |
| 5-3 Environmental Justice | 15 | 9-7 |

*As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. – Melanie Sattler*

**Emergency Phone Numbers**: In case of an on-campus emergency, call the UT Arlington Police Department at **817-272-3003** (non-campus phone), **2-3003** (campus phone). You may also dial 911. Non-emergency number 817-272-3381