

WSTE 380/580 - Solid Waste Management (3.0 cr)

Fall 2023

Lecture (2h): Monday 18:00-19:50 in TNR 255
Laboratory (3h): (I) Monday 14:00-16:50 or (II) Wednesday 14:00-16:50 in WEC 110
Pre-requisites: CNR Major or written consent from the instructor
Exam: December 18th, 2023 at 7:15pm

Instructor: Dr. R. Michitsch
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Office Hours: drop by office or by appointment or by Zoom

COURSE DESCRIPTION

Characterization, collection, recycling/disposal of municipal, industrial, and agricultural wastes, with emphasis on environmental effects related to disposal. Other topics will be explored. Students will find that there are frequently more questions than answers in the dynamic and competitive world of integrated waste management and resource recovery. This is a comprehensive class.

OBJECTIVES

1. Students will develop a basic understanding of the characteristics, generation, treatment, and management of municipal, commercial and high-volume industrial waste materials.
2. Students will critically evaluate integrated waste management and resource recovery processes and policies in Wisconsin and compare them with practices used elsewhere.
3. Students will develop written and/or oral presentation skills necessary to effectively convey technical, economic or social information related to integrated waste management and resource recovery.

PROFESSIONALISM

Disrespectful and disruptive behavior will not be tolerated. Students found exhibiting this behavior may be removed from the day's class. Ongoing behavioral problems will be reported to the appropriate authorities.

CHEATING/PLAGIARISM

Cheating and plagiarism will not be tolerated. You may work together in certain laboratory and class discussions, but you will do all individual assignments and exams independently. You must present your own interpretation of analyses and reflect your own understanding of the problem or assignment.

HOMEWORK ASSIGNMENTS

Homework assignments will be given periodically throughout the semester. These assignments are generally due one week later, depending on the complexity of the problem.

TEXTS

Old: Tchobanoglous G, Theisen H and Vigil SA. 1993. *Integrated Solid Waste Management*. McGraw-Hill.
New: Worrell W, Vesilind PA and Ludwig C. 2012. *Solid Waste Engineering*. Cengage Learning

Some research materials will be found in the library (http://libraryguides.uwsp.edu/waste_management). Various reference materials will be provided throughout the semester and will be available on Canvas.

GRADING

10%	Class Participation, Professionalism and Attendance
25%	Homework Assignments (4-6 total)
25%	Project/Presentation
20%	Midterm Exam
20%	Final Exam

PROJECT/PRESENTATION

During the course of the semester students will form teams (2-3 students per team) for research projects on topics closely related to integrated waste management or resource recovery. Each student and/or group will produce a 5-10 page research paper on the topic. Papers will be due during the last week of the semester. Teams will present findings of their research during the last lecture time of the semester in a 10-15 minute presentation. All team members must participate in the presentation.

Some suggested research topics for the project/presentation are provided below:

- Anaerobic digestion (municipal bio-solids, manures, high-strength organic waste)
- Beneficial reuse of industrial byproducts (coal ash, foundry sand, paper mill sludge)
- Byproduct utilization from the biofuels industry (DDGs, thin stillage, glycerin)
- Computer and electronics recycling
- Changing people's behaviors using educational program, social media or marketing
- Comparing various collection systems and collection efficiencies
- Dilemma of food waste and diverting food to the hungry/needy
- Environmental justice issues related to waste management (exporting, toxics)
- Food waste composting (small-scale versus regional approaches)
- Gasification of MSW in Brown County
- Landfill design – dry tomb versus bioreactors
- Landfill tipping fees
- Life cycle analysis – material selection and final disposition
- Medical waste management – pathogens, mercury, haz/toxic materials
- Out-of-state waste issues / waste policy issues (Interstate Commerce Clause, etc.)
- Plasma arc technology for the management of medical waste
- Plasma arc technology for municipal solid waste management
- Extended Producer Responsibility/Product Stewardship
- Recycling and solid waste management at UWSP
- Recycling of specific materials (tires, oil filters, plastics, etc.)
- Single stream recycling technologies/results
- Waste resource management and its role on sustainability
- Waste management and climate change
- Waste management in other countries (developed or developing)
- Waste-to-energy (landfill gas recovery, incineration with energy recovery, etc.)
- Wood waste – impacts of the emerald ash borer
- Zero Waste in Wisconsin-can it be achieved?

Other topics will also be considered, but must be approved in advance by the instructor.

USE YOUR IMAGINATION!!

Laboratory Safety

Safety procedures must be followed at all times to avoid danger to yourself and those you share laboratory with. If you ever have a safety question, **ASK!!!**

General – Basic safety equipment in the laboratory includes: eye wash station, safety showers, gloves, aprons, fire extinguishers, chemical absorbents, etc. You should be aware of the location of all these items

Chemical Spills – In the event of a spill:

1. Alert others in area.
2. Determine chemical type.
3. Put on necessary protective equipment.
4. Contain spill with absorbent.
5. Call **x3456** or **9-911** if necessary.

Note: not all chemicals can be contained with paper towels, in fact some chemicals are flammable in contact with organic materials such as paper.

Fire – In the event of a fire:

1. Turn off gas, remove flammables.
2. Alert others in area.
3. Determine chemical type.
4. Contain with appropriate material.

Attire – Chemical spills do happen. To avoid damage to your clothes or person we recommend: laboratory coats, old clothes, closed toe shoes, and (when necessary) use of PPE

Sharps – Needles, etc. are to be disposed of in “Sharps” containers, not the trash.

Equal Access and Disability Accommodations

If you have a condition that may impact your learning and/or participation in course activities, please contact the Disability Resource Center (DRC). The DRC will engage in an interactive process with students and identify appropriate academic accommodations and auxiliary services in accordance with the University’s legal obligations. Instructors, students, and DRC staff work collaboratively to establish any necessary adjustments or supports. Accommodations are rarely applied retroactively so it is vital that students make timely requests. Please let me know if you have questions. The DRC is located in 108 Collins Classroom Center and can be reached at 715/346-3365 and drc@uwsp.edu.

Commitment to Integrity:

As a student in this course and at UWSP you are expected to maintain high degrees of professionalism, commitment to active learning and participation in this class, and also integrity in your behavior in and out of the classroom.

UWSP Academic Honesty Policy & Procedures: Student Academic Disciplinary Procedures**UWSP 14.01 Statement of principles**

The board of regents, administrators, faculty, academic staff and students of the university of Wisconsin system believe that academic honesty and integrity are fundamental to the mission of higher education and of the university of Wisconsin system. The university has a responsibility to promote academic honesty and integrity and to develop procedures to deal effectively with instances of academic dishonesty. Students are responsible for the honest completion and representation of their work, for the appropriate citation of sources, and for respect of others' academic endeavors. Students who violate these standards must be confronted and must accept the consequences of their actions.

UWSP 14.03 Academic misconduct subject to disciplinary action.

- (1) Academic misconduct is an act in which a student:
 - (a) Seeks to claim credit for the work or efforts of another without authorization or citation;
 - (b) Uses unauthorized materials or fabricated data in any academic exercise;
 - (c) Forges or falsifies academic documents or records;
 - (d) Intentionally impedes or damages the academic work of others;
 - (e) Engages in conduct aimed at making false representation of a student's academic performance; or
 - (f) Assists other students in any of these acts.
- (2) Examples of academic misconduct include, but are not limited to: cheating on an examination; collaborating with others in work to be presented, contrary to the stated rules of the course; submitting a paper or assignment as one's own work when a part or all of the paper or assignment is the work of another; submitting a paper or assignment that contains ideas or research of others without appropriately identifying the sources of those ideas; stealing examinations or course materials; submitting, if contrary to the rules of a course, work previously presented in another course; tampering with the laboratory experiment or computer program of another student; knowingly and intentionally assisting another student in any of the above, including assistance in an arrangement whereby any work, classroom performance, examination or other activity is submitted or performed by a person other than the student under whose name the work is submitted or performed.

Unauthorized sharing of course materials:

Lecture materials, recordings, and other materials for this course are protected intellectual property at UW-Stevens Point. Students in this course may use the materials and recordings for their personal use related to participation in this class. Students may also take notes solely for their personal use. If a lecture is not already recorded, you are not authorized to record my lectures without my permission unless you are considered by the university to be a qualified student with a disability requiring accommodation. [Regent Policy Document 4-1] Students may not copy or share lecture materials and recordings outside of class, including posting on internet sites or selling to commercial entities. Students are also prohibited from providing or selling their personal notes to anyone else or being paid for taking notes by any person or commercial firm without the instructor's express written permission. Unauthorized use of these copyrighted lecture materials and recordings constitutes copyright infringement and may be addressed under the university's policies, UWS Chapters 14 and 17, governing student academic and non-academic misconduct.