

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

Fall 2019

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

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

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 (3-5 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 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/needly
- 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.