ENGG 4340 SOLID & HAZARDOUS WASTE MANAGEMENT

School of Engineering, University of Guelph
Fall 2011

Instructor:	Miln Harvey, Ph.D., P.Eng. University of Guelph (Tues, Thurs) Room 1415 Thornbrough; Ext. 53644 (only call during office hours; no voicemail) Email: TBD (I still am not on the University system yet) Schlumberger Water Services, Kitchener, ON
GTA:	Mohammad Showkatul (mshowkat@uoguelph.ca)
Lecture Times:	Tuesday and Thursday from 10:00 – 11:20 in MacKinnon 224
Tutorial:	Wednesday from 8:30 – 10:20 in MacKinnon 224
Office Hours:	Drop in either Tuesday or Thursday from 9:00 – 10:00
Text:	Tchobanoglous, Theisen and Vigil (1993 – 2nd Edition) Integrated Solid Waste Management, McGraw-Hill, ISBN-13:9780070632370 (ISBN-10: 0070632375) Additional information provided by Desire2Learn
Notes:	Some notes will be provided for each lecture in class.
Exams:	Final: Saturday Dec 10, 2011 from 8:30 to 10:30 h
Prerequisites:	ENGG 2560 or ENGG 2660
Announcements:	See Desire2Learn

Course Summary

Completion of this course will provide students with an understanding of i) waste generation and composition of solid waste; ii) physical and chemical properties of solid waste, iii) solid waste treatment and disposal alternatives; iv) positive and negative impacts associated with treatment and disposal alternatives; and, v) cross-media issues related to solid and hazardous waste treatment and disposal. Students will also become familiar with the technical literature dealing with solid and hazardous waste management.

Evaluation

The course will have the following components:

- Individual Literature Review 20%
- 3 Team Assignments 60%
    - Analysis of SWM Practices of selected Cities (15%)
    - Safety Issues in SWM (15%)
    - PBL Design Project Project (30%)
- Final Exam 20%

An integral part of the course is the ability to review and critique technical reports. Accordingly, literacy will be graded in all components listed above.

Course Outline

Solid waste generation rates and waste composition. Integrated waste management: collection, recovery, reuse, recycling, energy-from-waste, and landfilling. Biological treatment of the organic waste fraction - direct land application, composting, anaerobic digestion. Environmental impact of waste management and sustainable development. Cross media issues related to solid waste disposal. An introduction to hazardous waste management and treatment methods. Supporting information for the various assignments and projects will come from three nearby municipalities: the City of Guelph, the Region of Waterloo and the City of Toronto.

1. Introduction — 1 week
   - solid waste as a consequence of life
   - evolution of solid waste management
   - legislation and government agencies

2. Generation of solid wastes and their properties — 1.5 weeks
   - sources
   - physical, chemical and biological properties of MSW
   - physical, chemical and biological properties of HW
   - safety issues

3. Collection of solid wastes: transfer and transportation — 2 weeks
   - rages of generation
   - source separation
   - collection
   - transfer stations

4. Physical, biological and thermal waste treatment processes — 3 weeks
   - MRFs
   - composting
   - thermal treatment

5. Disposal of solid wastes and residual matter — 2 weeks
   - landfill design
   - landfill operations
   - bioreactors
   - leachate collection/treatment

6. Recovery of resources, conversion products and energy — 1 weeks
   - methane gas
   - co-generation
   - recycling

7. Hazardous wastes 1.5 weeks
   - legislation
   - household HW
   - landfills
   - incineration

Assignments

Several assignments will be issued throughout the term. Assistance will be available during the tutorial period (Wednesday 8:30 to 10:20; MACK 224) to assist in solving the problems and to provide the solutions. **Please note that complete solutions will not be posted, rather intermediate steps and the corresponding solution**.

Literature Review

Each student will complete one literature review on a solid/hazardous waste issue of his/her own choice. The topic does not have to be approved by the instructor. The review should be based on about 10 references; with at least five of the references from refereed journal articles. The length of the review should be six (6) pages, plus the reference page. More information will be available on D2L. The due date is Thursday September 29, 2011 at the start of the lecture. Late literature review will not be accepted. **There will be no exceptions. See the statement below on Academic Misconduct**.

Final Exam

The final exam will be comprehensive of all the material covered. Questions will be a combination of short answer and discussion. Failure to attend the exam will lead to a zero for that exam. The only exception will be for students with a medical reason signed by a physician. **There will be no exceptions.**

Please Note:

- **the Regulations concerning Academic Misconduct as outlined in the University of Guelph, Undergraduate Calendar FOR 2011-2012 will be strictly enforced.**
    - **accordingly, when you submit you Literature Review please include a statement that the submitted work was a solo effort. This also requires that you provide you SMP number if you are an engineering student for all project submissions. Failure to include this statement and a valid SMP number will mean that you submission will not be graded**
- **there will be no supplemental work for improved grades**
- **The GTA has no office hours as there is sufficient contact time in the tutorials**

Disclaimer

The instructor reserves the right to change any or all of the above in the event of appropriate circumstances, subject to University of Guelph Academic Regulations.