ENGG*4340 SOLID & HAZARDOUS WASTE MANAGEMENT

School of Engineering, University of Guelph
Fall 2010

Instructor: Dr. Richard G. Zytner, P.Eng., FEC; Room 2337 Thornbrough; Ext. 53859

GTA: Tutorial GTA: TBD *GTAs have no office h; sufficient contact time in tutorial*

Lecture Times: Tuesday and Thursday from 13:00 to 14:20 in CRSC116

Tutorial: Friday from 14:30 to 16:30 in CRSC116.

Office Hours: Just drop by. Fixed times are Tuesday and Thursday from 11:00 to 12:00 or by appointment.

Texts/Notes: George Tchobanoglous, Hilary Theisen and Samuel Vigil (1993-2nd eddition); Integrated Solid Waste Management, McGraw-Hill, ISBN-13: 9780070632370 (ISBN-10: 0070632375), 992p. Additional information provided on Desire2Learn.

Exams: *Final*: TBD

Prerequisites: As stated in the U of G Calender

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

- Individual Literature Review 20%
- Three Team Reports 60%
  - Analysis of SWM practice of selected cities (15%)
  - Safety Issues in SWM (15%)
  - PBL Design 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 the components listed above.

COURSE OUTLINE

Solid waste management, especially municipal solid waste, is one of the most significant problems in the world with major environmental, political, economic and public health implications. It is also subject to a great deal of confusion, misinformation, inconsistent regulations and laws, corruption and political mismanagement. Therefore, in addition to the engineering aspects of waste management, the course will consider a number of related issues which are often more challenging than the engineering ones.

Supporting information for the various assignments and projects will come from the three municipalities. The City of Guelph, City of Toronto and Region of Waterloo. Information from other municipalities will be used as required.

I - Introduction 1 week
- solid wastes as a consequence of life
- evolution of solid waste management
- legislation and governmental agencies.

II - 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

III - Collection of solid wastes: transfer and transport 2 week
- rates of generation
- source separation
- collection
- transfer stations

IV - Physical, biological and thermal waste treatment processes and equipment 3 weeks
- MRFs
- composting
- thermal treatment

V - Disposal of solid wastes and residual matter 2 weeks
- landfill design
- landfill operation
- bioreactor
- leachate collection/treatment
- closure

VI - Recovery of resources, conversion products and energy 1 week
- methane gas
- co-generation
- recycling

VII- 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 (Friday 14:30 to 16:30) 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 her/his choice. The topic does not have to be approved by the instructor. The review should be based on about ten references; with at least five of the references from referred journal articles. The length of the review should be six pages, plus the reference page. More information on D2L. The due date is September 30, 2010 at the start of the lecture. Late Literature Reviews will not be accepted. **There will be no exceptions.** See the statement below on Academic Misconduct.

Field Trips:
Tentative arrangements have been made for two field trips. These trips will be scheduled during the tutorial period on Friday afternoons. However, due to travel time, additional time will be needed to complete the trip. Efforts will be made to minimize impact on other courses. Assignments may be based on the visits.

1. September 24 and October 1, 2010, Region of Waterloo Landfill: 13:30 to 17:00.
2. October 29, 2010, Waste Resource Innovation Centre, City of Guelph: 12:30; 13:30 and 14:30.

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 2010-2011 will be strictly enforced.**
  - accordingly, when you submit your Literature Review please include a statement that the submitted work was a solo effort. This also requires that you to provide your 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 your submission will not be graded.

- **There will be no supplemental work for improved grades.**
- **The GTAs have no office hours as there is sufficient contact time in the tutorials.**

DISLAIMER

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.

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July 13, 2010