CHBE 486 Waste Management for Resource Recovery

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Lectures: Mon Wed  4:30 – 6:00 pm  CHBE 102
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Website: http://canvas.ubc.ca
Course notes: No prescribed textbook. Lecture notes and additional materials will be provided through the course website.

Evaluation:
- Assignments (4)  16%
- Midterm exam (Mar 1)  30%
- Quiz (Mar 27)  4%
- Oral presentation (Mar 29, Apr 3, Apr 5, Apr 12)  10%
- Term paper (due Apr 17)  40%

Learning Outcomes:
Upon successful completion of this course, students will be able to:

- Classify the sources and types of wastes
- Characterize different types of solid waste and wastewater
- Develop a conceptual understanding of integrated resource recovery from wastes
- Discuss and analyze various thermal/thermochemical and biological/biochemical processes for solid waste management
- Apply preprocessing and pretreatment methods for solid wastes
- Determine the quality of products and know the applicable standards
- Analyze wastewater treatment processes for various forms of resource recovery

Topics

1. Introduction
   Classifying the sources and types of wastes: forest-origin, agricultural, industrial, municipal
   Waste management practices and integrated resource recovery

2. Solid waste management – waste characteristics and technologies for resource recovery
   Characteristics of solid wastes
   Types of processes and systems – an overview
   Recovery of resources – energy, bioproducts, industrial products
   Product quality assessment
   Preprocessing and pretreatment methods
   Thermal processes
   Physical and chemical processes
   Biological processes
   Waste air utilization
3. **Wastewater management – wastewater characteristics and technologies for resource recovery**

- Characteristics of wastewater
- Types of processes and systems – an overview
- Recovery of resources – energy, nutrients, potable water
- Physico-chemical processes
- Biological processes
- Thermal processes

**References**

Technical reports
Journal papers
Articles from magazines
Conference proceedings
etc.

**Books**

Term Paper - 3 students per group

Purpose:

The purpose of the term paper is either:

1) To perform and summarize literature review, with critique, on technologies relevant to waste management for resource recovery; or

2) To propose and analyze waste management options for resource recovery, for a specific industry, community, or region (for instance, conducting a feasibility study).

Scope:

- Background description (outline of the problem, the approach to be adopted, and the significance of the work)
- Waste characterization
- Discussion and analysis of alternatives (physico-chemical, biological and/or thermal methods)
- Performing engineering calculations where applicable
- Recommendation of the selected option based on your analysis, where applicable
- Economic analysis (optional)

Please discuss the scope of your term paper with the instructor if it will be somewhat different.

Report:

An essay of 4,500-5,000 words PLUS references, illustrations (diagrams and data, presented in tables and figures format), and appendices

Evaluation will be based on technical contents (75%) and organization (25%)

Please submit an electronic copy of your term paper via the course website (http://canvas.ubc.ca) by the due date.