ENGG*4340 Solid and Hazardous Waste Management
Fall 2016

School of Engineering

(August 29, 2016)

---

1 INSTRUCTIONAL SUPPORT

1.1 Instructor

Instructor: Bassim E. Abbassi, Ph.D.
Office: THRN 2333, ext. 52040
Email: babbassi@uoguelph.ca
Office hour: Tue. & Thur. (1:00 PM to 3:00 PM) & Wednesdays (2:00 PM to 3:00 PM) or by appointment

1.2 Teaching Assistants

GTA	Email	Office Hours
Kayla Schmidt	kschmi01@uoguelph.ca	TBA on Courselink
Mary Mekhail	mekhailm@uoguelph.ca	TBA on Courselink

---

2 LEARNING RESOURCES

2.1 Course Website

Course material, news, announcements, and grades will be regularly posted to the ENGG*4340 Courselink site. You are responsible for checking the site regularly.

2.2 Required Resources

1. Required resources will be distributed via Courselink

   Part of the course will be using the "Handbook of Solid Waste Management". George Tchobanoglous and Frank Kreith. McGraw-Hill, (ISBN: 0-07-150034-0). Freely downloadable from internet.

2.3 Recommended Resources

Book A: Integrated Solid Waste Management, Engineering Principals and Management Issues. George Tchobanoglous, Hilary Theisen, Samuel Vigil. McGraw-Hill, (ISBN: 0-07-063237-5)

Book B: Hazardous Wastes: Sources, Pathways, Receptors. Richard J Watts. John Wiley & Sons.

2.4 Additional Resources

Lecture Information: Some lecture notes will be posted on Courselink, generally before the specific lecture. Note that posted notes might be incomplete, prepared with the intention that students will take additional notes during lectures.

Tutorial Information: The handouts for all the tutorial sessions will be posted within the tutorial section. All types of resources regarding tutorials, links to web pages can be found in this section.

Project Information: Requirements will be posted on Courselink

Miscellaneous Information: Other information will be posted on Courselink.

2.5 Communication & Email Policy

Please use lectures and tutorial sessions as your main opportunity to ask questions about the course. Major announcements will be posted to the course website. **It is your responsibility to check the course website regularly.** As per university regulations, all students are required to check their <mail.uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

3 ASSESSMENT

3.1 Dates and Distribution

Quizzes	15 %	September 22, in class October 6, in class November 10, in class November 24, in class
Project	25 %	Submission 1: Friday Oct. 7, Courselink Submission 2: Friday Oct. 28, CourseLink Presentations: During the tutorial hours (Nov. 7, 9 & 11) and (Nov. 14, 16 & 18) Final Submission: Friday Nov. 25 Both paper and electronic copies (to be submitted via CourseLink Dropbox) are required
Midterm Exam	20 %	Tuesday Oct. 25, in class
Final Exam:	40 %	Thursday Dec. 9, 07:00 PM - 09:00 PM Room TBA on Web advisor

3.2 Course Grading Policies

Missed Assessments: If you are unable to meet an in-course requirement due to medical, psychological, or compassionate reasons, please email the course instructor. Please see below for specific details and consult the undergraduate calendar for information on regulations and procedures for Academic Consideration:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Accommodation of Religious Obligations: If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements. See the undergraduate calendar for information on regulations and procedures for Academic Accommodation of Religious Obligations:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-accomrelig.shtml

Passing grade: In order to pass the course, you must obtain a grade of 50% or higher on aggregate from all the assessments.

Missed tests: If you miss a test due to grounds for granting academic consideration or religious accommodation, the weight of the missed test will be added to the final exam. There will be no makeup midterm tests or quizzes.

Team Work: Team work is required for the project assignment. If there is some observation or evidence that you have not been an approximately equal contributor to the work then you will be asked to provide evidence of your individual efforts, contributions and results. Keeping a log book may be one effective means to help demonstrate your contributions.

4 AIMS, OBJECTIVES & GRADUATE ATTRIBUTES

4.1 Calendar Description

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.

Prerequisite(s): ENGG*2560 (Environmental Engineering Systems) or ENGG*2660 (Biological Engineering Systems)
Corequisite(s): - None

4.2 Course Aims

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.

4.3 Learning Objectives

At the successful completion of this course, the student will have demonstrated the ability to:

1. Understand the concept of integrated waste management and the regulatory framework
2. Able to characterize the waste components for different components and properties and use the characteristics to make suitable decision on waste management options
3. Able to identify and classify hazardous wastes and explain the techniques of hazardous waste management
4. Design the refuse collection system, transfer station basics, economics of using transfer station in waste collection and transfer systems
5. Evaluate different methods of processing of municipal solid waste for its beneficial reuse, recycling, materials separation, treatment, and disposal
6. Perform preliminary design calculations for combustion and energy recovery systems and biochemical processes.
7. Design landfill systems: siting issues, leachate collection system, gas collection system.

4.4 Graduate Attributes

Successfully completing this course will contribute to the following CEAB Graduate Attributes:

Graduate Attribute	Learning Objectives	Assessment
1. Knowledge Base for Engineering	1, 2, 3, 5,	Quizzes, Exams
2. Problem Analysis	-	Quizzes, Exams, Project
3. Investigation	2, 3, 5	Project
4. Design	4, 6, 7	Project, Exams
5. Use of Engineering Tools	3, 4, 5, 6	Exams, Project
6. Communication	2, 3, 5	Exams, Project
7. Individual and Teamwork	-	Project
8. Professionalism	-	Project
9. Impact of Engineering on Society and the Environment	1, 3	Project
10. Ethics and Equity	-	-
11. Business & Project Management	1, 7	Project, Exams
12. Life-Long Learning	1	-

4.5 Instructor's Role and Responsibility to Students

The instructor's role is to develop and deliver course material in ways that facilitate learning for a variety of students. Selected lecture notes will be made available to students on CourseLink/D2L but these are not intended to be stand-alone course notes. During lectures, the instructor will expand and explain the content of notes and provide example problems that supplement posted notes. Scheduled classes will be the principal venue to provide information and feedback for tests and project.

4.6 Students' Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during lectures and tutorials. Students, especially those having difficulty with the course content, should also make use of other resources recommended by the instructor. Students who do (or may) fall behind due to illness, work, or extra-curricular activities are advised to keep the instructor informed. This will allow the instructor to recommend extra resources in a timely manner and/or provide consideration if appropriate.

4.7 Relationships with other Courses & Labs

Previous Courses:

ENGG*2560: Environmental Engineering Systems: The fundamental concepts of engineered systems including chemical, physical and biological processes taught in this course will be used a lot in the present course**.**

Or

ENGG*2660: Biological Engineering Systems: The fundamental concepts of engineered systems including chemical, physical and biological processes taught in this course will be used a lot in the present course**.**

Follow-on Courses:

ENGG*41X: Environmental Engineering Design

ENGG*4260: Water and Wastewater Design

ENGG*4070: Life Cycle Technique for Sustainable Design

---

5 TEACHING AND LEARNING ACTIVITIES

5.1 Timetable

Lectures:

Tues and Thur		10:00 AM – 11:20 AM	MCKN, Room 029

Tutorials:

Section 01	Fri	08:30 AM - 10:20 AM	ROZH, Room 108
Section 02	Wed	03:30 PM - 05:20 PM	MCKN, Room 310
Section 03	Mon	02:30 PM - 04:20 PM	MCKN, Room 313

5.2 Lecture Schedule (approximate)

Lectures	**Lecture Topics**	**References**	**Learning Objectives**
1-2	Introduction to solid waste management	Chapter 1/Book A	1
3-4	Legislative trends and impacts	Handouts	1, 2, 3
5-6	Sources, types and composition of MSW	Chapter 3/Book A	2, 5
7-8	Physical, chemical, and biological properties of MSW	Chapter 4/Book A	2, 3, 4
9-12	Hazardous waste	Handouts/Book B	3, 5
13-14	Solid waste generation and collection rates	Chapter 6/Book A	2, 3, 4
15	Waste handling and separation, storage, and processing at source	Chapter 7/Book A	4
16-17	Collection of solid waste	Chapter 8/Book A	3
18-20	Separation and processing of solid waste	Chapter 9/Book A	4, 5, 6
21	Transfer and transport	Chapter 10/Book A	4, 5
22-24	Disposal of solid wastes	Chapter 11/Book A	7

5.3 Other Important Dates

Thursday, September 8, 2016: First day of class
Monday, October 10, 2016: Thanksgiving holiday
Tuesday, October 11, 2016: Fall Study Break Day, Class rescheduled to December 1
Friday, November 4, 2016: 40th class day – last day to drop classes
Wednesday, November 30, 2016: Regular classes conclude
Thursday, December 1, 2016: last day of class

6 LAB SAFETY

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students. As a student in a lab course you are responsible for taking all reasonable safety precautions and following the lab safety rules specific to the lab you are working in. In addition, you are responsible for reporting all safety issues to the laboratory supervisor, GTA or faculty responsible.

7 ACADEMIC MISCONDUCT

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member.

7.1 Resources

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

A tutorial on Academic Misconduct produced by the Learning Commons can be found at:
http://www.academicintegrity.uoguelph.ca/

Please also review the section on Academic Misconduct in your Engineering Program Guide.

The School of Engineering has adopted a Code of Ethics that can be found at:
http://www.uoguelph.ca/engineering/undergrad-counselling-ethics

8 ACCESSIBILITY

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability for a short-term disability should contact the Centre for Students with Disabilities as soon as possible.

For more information, contact CSD at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: http://www.uoguelph.ca/csd/

9 RECORDING OF MATERIALS

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

10 RESOURCES

The Academic Calendars are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs: http://www.uoguelph.ca/registrar/calendars/index.cfm?index