ENGG*4240 Site Remediation

Fall 2016

School of Engineering

(Revision 0: 28JULY2016)

1 INSTRUCTIONAL SUPPORT

1.1 Instructor

Instructor: Richard G. Zytner, PhD, P.Eng.,FEC.
Office: THRN 2337; Ext. 53859
Email: rzytner@uoguelph.ca

Office hours: Just drop by with the exception of Fridays. Fixed time is Tuesday from 11:00 to 12:00 or you can make an appointment.

1.2 Lab Technician - Not Applicable

1.3 Teaching Assistants - Christopher Morgan
Has no office hours. Contact time is in lab on Mondays from 13:30 to 14:30 h on MCKN 311.

2 LEARNING RESOURCES

2.1 Course Website

Course material, news, announcements, and grades will be regularly posted to the ENGG*4240 *Courselink* site. You are responsible for checking the site 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 students.

2.2 Required Resources

1) Kuo, J. (2014) Practical Design Calculations for Groundwater and Soil Remediation, CRC Press, Bova Raton, FL, 2nd Edition, ISBN 13:978-1-4665-8523-2

2.3 Additional Resources

Lecture: As new course, notes are not available for this course. Some supporting information will be posted on the Courselink site.

Projects: Download the assignments according to the schedule given in this handout and posted on Courselink.

2.4 Announcements

Information related to ENGG*4240 will be posted on Courselink. In addition, per university regulations, all

students are required to check their <mail.uoguelph.ca> e-mail account regularly. This e-mail is the official route of communication between the University and students.

3 ASSESSMENT

3.1 Dates and Distribution

Individual Lit Review	15%	26 Sept. 2016 @ 17:00 h
Three Team Projects		
1) Phase I	15%	7 Oct. 2016 @ 17:00 h
2 Phase II	20%	4 Nov. 2016 @ 17:00 h
2) Remediation Project	25%	30 Nov. 2016 @ 17:00 h
Final Exam	25%	08 Dec. 2016 @ 17:00 h

Additional assignments will be given throughout the term but they will not be graded. Consider them as formative.

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. See 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 at 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, students must obtain an overall grade of 50% or higher on the aggregate of all the course work outlined in Section 3.1.

Late Reports: There will be no extension of the deadlines for submissions, except for serious health or compassionate reasons, with the appropriate documentation. Just like the consulting world where projects are not awarded if the proposals are late, a grade of zero will be given for late submissions.

Certification: Students must write their PEO SMP (Student Membership Program) number on all submitted work. This signifies that the SOE Code of Ethics was adhered to. For group projects, students must also state that they contributed to the group effort in an equitable manner.

3.3 Course Format

Classes are scheduled twice a week on Tuesday and Thursdays. There is also a lab on Mondays. The format of the course is problem based learning, where students will learn by doing. It is expected that each team member will spend an average of 10 to 12 h per week on the course. The active learning component will require group discussions and presentations on material related to the lecture material.

Students will work in teams of three or four persons. Course instructor will assist with the formation of the groups as required. Students will have the option of changing groups after the first project.

4 AIMS, OBJECTIVES & GRADUATE ATTRIBUTES

4.1 Calendar Description

Remediation of contaminated sites is done to mitigate impacts to the environment and public health. The course will: review the applicable legislation; identify the important soil, water, air and chemical

interactions; review the steps of an environmental risk assessment so that contaminated sites can be identified and evaluated to see if remediation is required; and evaluate and appraise various remediation technologies to complete the soil and groundwater remediation.

Co-requisite(s): ENGG*3590, ENGG*3670

4.2 Course Aims

Completion of this course will provide students with an (i) an understanding on what classifies a site as being contaminated and the governing legislation, (ii) appreciation of cross-media issues for a contaminant in the groundwater, soil and soil-air matrices, (iii) appreciation of human health and ecological risk assessment in context of a contaminated site, (iv) insight on how to select and apply appropriate soil and groundwater remediation technologies and (v) design a remediation action plan. Students will also become familiar with the technical literature dealing with contaminated sites. The following specific activities will be required:

i) **Submit a Literature Review**: Students will complete a comprehensive literature that will identify the resources available to them and will critique a site remediation theme.

ii) **Submit an Phase I and II Project:** Students will complete a Phase I and II assessment of a given property and determine if site remediation is required.

iii) **Submit a Remediation Project:** Based on a given site, students will design a remediation plan to address the contamination present.

4.3 Learning Objectives

The goal is to prepare students to deal with open-ended site remediation problems that consist of contaminated groundwater and soil, similar to situations that they will encounter as working professionals. To that end, students will: (1) prepare a literature review on a site remediation topic of their choice, (2) collect and analyze relevant information for a target site to complete Phase I and II assessments, (3) complete a risk assessment on the target site to evaluate whether site remediation is needed and (4) design a remediation plan for the target site.

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	1,2,3,4	Lit. Review, Projects & Exam
2. Problem Analysis	2,3,4	Projects & Exam
3. Investigation	2,3,4	Projects & Exam
4. Design	4	Projects
5. Use of Engineering Tools	3,4	Projects
6. Communication	1,2,3,4	Lit Review & Projects
7. Individual and Teamwork	1,2,3,4	Lit Review & Projects
8. Professionalism	-	-
9. Impact of Engineering on Society and the Environment	2,3, 4	Project
10. Ethics and Equity	-	-
11. Environment, Society, Business & Project Management	1,2,3,4	Lit Review & Project
12. Life-Long Learning[#]	-	-

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. Some supporting 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 projects.

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

ENGG*4240 is senior Environmental Engineering elective. As such, students are required to build on the knowledge gained in all the preceding courses, applying engineering analysis and design principles to the design problem at hand.

5 TEACHING AND LEARNING ACTIVITIES

5.1 Timetable

Lectures: Tuesday and Thursday from 14:30 to 16:00 in Graham 2310
Tutorial: Monday from 13:30 to 14:20 in MCKN 311

Lecture Schedule

Week No.	Classroom Activity
1	Definition of contaminated site; Remediation Legislation; Handout Literature Review
2	Overview of Remediation Technologies; Contaminant, Soil, Water and Air Interactions
3	Contaminant fate & behaviour in soil and groundwater; chemical transformation; sorption - retention capacity
4	Contaminant fate & behaviour in soil and groundwater; retardation; degradation - scale-up factor
5	Contaminant fate & behaviour in soil and groundwater; volatilization - gas transfer; degradation - scale-up factor
6	Short Week - Thanksgiving and Study day
7	Environmental Site Assessment - Phase I & II - work on PBL problem
8	Environmental Site Assessment - Phase I & II - work on PBL problem
9	Soil and Groundwater Remediation - work on PBL problem
10	Soil and Groundwater Remediation - work on PBL problem
11	Soil and Groundwater Remediation - work on PBL problem
12	Soil and Groundwater Remediation - present solutions

5.2 Other Important Dates

i) Classes begin Thursday 8 Sept. 2016
ii) Thanksgiving: 10 Oct. 2016
iii) Study Day: 11 Oct. 2016
iii) Last date to drop course – 40th class: Friday, 04 Nov. 2016
iv) Last class: Friday, 02 Dec. 2016

6 LAB SAFETY

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students whether in lectures, tutorials, laboratories and all campus facilities. Procedures outlined in the SOE Laboratory Safety Manual must be followed at all times:

http://www.uoguelph.ca/engineering/sites/default/files/safety_lab_manual.pdf

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

7.1.1 Turnitin

Accounts are available to students on Turnitin to help with the editing of their submissions to ensure that plagiarism did not take place. Go to http://www.turnitin.com/en_us/home and create an account. For F16, Class ID: 13054678 and password: 4240F16. The School has been assured by the College that Turnitin does not store student work, so please take advantage of this tool when preparing your written submissions.

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