ENGG*3590 – Water Quality
Fall 2013

School of Engineering

(Revision 0: September 5, 2013)

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1 INSTRUCTIONAL SUPPORT

1.1 Instructor

Instructor: Khosrow Farahbakhsh, Ph.D., P.Eng.
Office: THRN 3515, ext. 53832
Email: khosrowf@uoguelph.ca
Office hours: As needed or by appointment

1.2 Lab Technician

Technician: Joanne Ryks
Office: THRN1114, ext. 54087
Email: jryks@uoguelph.ca

1.3 Teaching Assistants

GTA	Email	Office Hours
Iryna Samoilenko	samoilei@uoguelph.ca	TBA on Courselink
Nishant Mistry	nmistry@uoguelph.ca	TBA on Courselink

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2 LEARNING RESOURCES

2.1 Course Website

Course material, news, announcements, and grades will be regularly posted to the ENGG*3590 Courselink site. You are responsible for checking the site regularly.

2.2 Required Resources

N/A

2.3 Recommended Resources

Tchobaboglous and Schroeder. 1987. Water Quality, Addison Wesley Longman.

2.4 Additional Resources

Lecture Information: Powerpoint lecture notes will be posted on the courselink. Please note that the posted lecture notes will include only a portion of information presented during the class. Other information will be provided during the lectures through examples and problems.

Lab Information: The lab manual will be posted on the Courselink.

Assignments: Download the assignments according to the schedule given in this handout. All the solutions will be posted as indicated.

Library Reserve: One copy of the recommended textbook as well as additional problems with solutions will be available on library reserve. You are strongly encouraged to work through the additional problems to sharpen your problem-solving skills for this course.

2.5 Communication & Email Policy

Please use lectures and lab help 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 <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its student.

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3 ASSESSMENT

3.1 Dates and Distribution

Labs: 15% (10% lab report and 5% in lab quizzes)

Design Project: 30%

Midterm test 1: 15%
Mon Oct 7, 20:30 -21:50, Room TBA on Courselink

Midterm test 2: 15%
Mon Nov 11, 20:30 -21:50, Room TBA on Courselink

Final Exam: 25%
Tue Dec 10, 19:30 – 21:30, Room TBA on Webadvisor

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 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 pass (grade of 50% or greater) the laboratory/design project and exam (midterms and final exam) portions of the course.

Missed midterm 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.

Lab Work: You must attend and complete all laboratories. If you miss a laboratory due to grounds for granting academic consideration or religious accommodation, arrangements must be made with the teaching assistant to attend an alternate lab (same lab conducted on an alternate date).

Late Lab Reports: Late submissions of lab reports will not be accepted.

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4 AIMS, OBJECTIVES & GRADUATE ATTRIBUTES

4.1 Calendar Description

This course builds on the student's experience in chemistry, biology, physics and fluid mechanics, and provides an engineering perspective on: (i) standard methods of water quality analysis for physical, chemical and biological characteristics of water; (ii) significance and interpretation of analytical results, (iii) modeling of water quality in natural systems and (iv) introduction to engineered water and wastewater treatment systems.

Prerequisite(s):

ENGG*2230, ENGG*2560, (1 of BIOL*1040, BIOL*1090, MICR*1020, MICR*2420), STAT*2120

4.2 Course Aims

Water Quality is an essential course for undergraduate students in the Water Resources and Environmental Engineering programs. The concepts and principles presented give students the necessary engineering skills to address the water quality issues they will face in their senior year, during their work terms and upon graduation. The course will also attempt to introduce a system's approach to water management.

This course builds on the student's experience in chemistry, fluid mechanics, environmental engineering systems, engineering science and provides an engineering perspective on:

- global perspectives on water
- water quality and characterization and interactions between various quality parameters
- significance and interpretation of analytical results
- modeling of water quality in natural systems
- introduction to water treatment system design

4.3 Learning Objectives

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

1. Understand the theoretical and practical implications of various water quality issues
2. View water quality from technical, scientific and socio-political perspectives
3. Perform basic water quality analytical tests such and make appropriate interpretations of water quality data
4. Perform preliminary design of conventional water treatment plants
5. Communicate findings from laboratory test as well as water treatment design to a wide audience
6. Understand and communicate relationship between various water quality parameter and ecosystem and public health
7. Perform water quality-related calculations.

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, 3, 6, 7	Midterms, Exams
2. Problem Analysis	-	Midterms, Exams, Design Project
3. Investigation	3, 4, 5	Labs, lab reports, design project
4. Design	3, 4, 5	Design Project
5. Use of Engineering Tools	3, 5	Labs
6. Communication	2, 4, 5, 6	Labs, Design Project
7. Individual and Teamwork	-	Labs and Design Project
8. Professionalism	2, 5	
9. Impact of Engineering on Society and the Environment	2, 5	Design Project
10. Ethics and Equity	2	-
11. Environment, Society, Business, & Project Management	2, 3, 4, 5, 6	Design Project, Midterms, Exam

12. Life-Long Learning	2	-

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*2230: Fluid Mechanics – fluid properties (i.e. density, viscosity, etc.), Bernoulli and Momentum equations, pipe flow and open channel flow

ENGG*2560: Environmental Engineering Systems - Analysis techniques for natural and engineered systems including chemical, physical and biological processes, mass balance analysis for steady state and unsteady state situations, analysis under both equilibrium and non-equilibrium conditions, reactor types including batch, plug-flow, CSTR

1 of BIOL*1040, BIOL*1090, MICR*1020, MICR*2420: Water Quality will build on the concepts from microbiology particularly when discussing wastewater characterization and water treatment.

STAT*2120: Laboratory reports rely heavily on statistical analysis and interpretation of data.

Follow-on Courses:

ENGG*4260: Chemical, physical and biological treatment processes, water quality, treatment plant design

5 TEACHING AND LEARNING ACTIVITIES

5.1 Timetable

Lectures:			
Thursday		19:00 – 21:50	MACK 031
Seminars:			
Monday		20:30 – 21:50	MINS 300
Laboratory:			
Tuesday	Sec 01, 02	11:30 - 14:20	THRN 1116
Friday	Sec 03, 04	14:30 - 17:20	THRN 1116

5.2 Lecture Schedule

I – Introduction – Water and Civilization — Week 1

II – Water Characterization — Weeks 2 - 5

- Physical
- Chemical
- Biological
- Ecological

III - Analysis and Sampling Methods — Week 6

- Sampling techniques
- Common water quality analyses
- Due diligence

IV – Water Quality Modeling

- Simple river model (oxygen sag) — Week 7

IV - Water Treatment — Weeks 8 - 11

- history
- pretreatment - source, screens, pre-chlorination, sedimentation, aeration
- treatment – coagulation & sedimentation (Type I and Type II settling), filtration, ozonation, post chlorination
- overview of special treatment processes

5.3 Lab Schedule

Check Courselink for laboratory topics and schedule.

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