



ENGG*2560 Environmental Engineering System Winter 2016

School of Engineering
(v2016 01 09 posted)

1 INSTRUCTIONAL SUPPORT

1.0 Instructor

Instructor: Warren Stiver, Professor
Office: THRN 1343, ext. 54862
Email: wstiver@
Office hours: Open door policy and by appointment

1.1 Lab Technicians

| | |
|-------------------|----------------------|
| Joanne Ryks | Ryan Smith |
| THRN1114 | THRN1114 |
| JRyks@uoguelph.ca | RSmyth17@uoguelph.ca |

1.2 Teaching Assistants

| GTA | Email | Office Hours |
|--------------|---------------------|------------------------|
| Yvonne Post | ypost@uoguelph.ca | NONE ... use labs well |
| David Rogala | drogala@uoguelph.ca | NONE ... use labs well |

2 LEARNING RESOURCES

2.0 Course Contact Hours (Lectures, Labs, & Tutorials)

The lectures, labs and tutorials are the primary means used to support your learning in this course. Lectures will be the primary means for course news and announcements in addition to provision of course materials. Lecture attendance is expected. Tutorials will be the primary means for the instructional team to coach you. Tutorial attendance is expected. Labs will be the primary means for some hands-on experience. Lab attendance is required.

2.1 Course Website

ENGG*2560 Courselink site will provide copies of lecture slides, project descriptions and assignments. You will find sample problems, sample codes and additional resources at the instructor's website <http://www.uoguelph.ca/~wstiver/teaching/>.

2.2 Required Resources

1. None

2.3 Recommended Resources

Courselink site and instructor's website will provide additional resources.

2.4 Additional Resources

Lecture Information: All the lecture slides will be posted on the Courselink site.

Lab Information: Posted on Courselink.

Assignments: Posted on Courselink.

Exams: Old tests and finals are posted as samples.

Miscellaneous Information: See Courselink.

2.5 Communication & Email Policy

Communication associated with course material is delivered by a combination of the lectures, lab/tutorials, the Courselink site and instructor's website. It is your responsibility to receive communication from ALL of these sources – there will be some mutual reinforcement between these sources but they are not completely redundant sources. 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

3.0 Dates and Distribution

| | | |
|------------|-------------------|---|
| FINAL EXAM | 35% | Friday, April 15 th , 7:00 pm |
| TEST | 15% | Thursday, February 25 th , 5:30 – 6:50 pm, RICH2520 |
| LABS# | 10% 25% 15% | Batch Reactor Lab – Due Sunday Feb 7 th , 6:00 pm Reactor Systems Lab – Due Sunday March 13 th , 6:00 pm Noise Lab – Due Sunday April 3 rd , 6:00 pm |

For students with less than 50% on the Final Exam & Test combination, the weighting of the LABS drops to zero and the weighting of the FINAL EXAM and TEST moves to 70% and 30%, respectively.

3.1 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: To pass the course students must obtain a grade of 50% or higher.

Missed test: If you miss the test due to grounds for granting academic consideration or religious accommodation, the weight of the missed test will be added to the final exam.

Lab Work: You must pass the laboratory safety quiz to be permitted to complete the hands on laboratories. You must attend and complete the hands on laboratory in order to be eligible to complete the required written laboratory report.

Late Lab Reports: Late submissions (without instructor permission based on suitable grounds and documentation) will be penalized. The penalty will depend on how late: 10% for 1-12 hours; 25% for 12-48 hours; 50% for 48-96 hours and 100% after 96 hours.

Previous Year's Lab Work: If this is your second attempt at this course then you have the option to not repeat the experimental labs. You must exercise this option by Friday January 15th (6:00pm) via an email to the instructor (wstiver@). If you exercise this option then your grade from the previous year's labs will be used for this attempt. You are still responsible for test and exam related assessment. You may choose this option for all or any one of the three labs.

Teamwork: Teamwork is required for the completion of the three labs in the course. It is expected that you are an active member of the team and provided an approximately equal contribution to the submitted work. If it becomes apparent that this is not the case then the instructor may assign a substantially different (lower) grade for a member of the team.

4 AIMS, OBJECTIVES & GRADUATE ATTRIBUTES

4.0 Calendar Description

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. Noise pollution, control and prevention.

Prerequisite(s): CHEM*1050, MATH*2270

4.1 Course Aims

This course aims to establish fundamental chemical engineering skills necessary to address environmental engineering systems. The course also aims to introduce basic noise modelling and control approaches.

4.2 Learning Objectives

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

1. **Apply (3)** chemical mass balances to a range of environmental engineering components.
2. **Develop (5)** mathematical models of a range of environmental engineering systems.
3. **Develop (5)** computer models of environmental engineering systems.
4. **Explain (2)** basic noise control approaches.
5. **Apply (3)** basic noise modelling equations.
6. **Develop (5)** computer models of noise equations.
7. **Demonstrate (3)** safe laboratory practices based on guidance provided.
8. **Produce (4)** experimental results in an interpretable form (effective tables and figures).
9. **Discriminate (4)** between good and not-so-good experimental results and between model and experiment.
10. **Formulate (5)** a credible set of conclusions and recommendations based on experimental objectives.
11. **Prepare (3)** a well-structured laboratory report.

4.3 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, 4, 5 | Tests, Exams, Labs |
| 2. Problem Analysis | 1, 2, 4, 5 | Tests, Exams, Labs |
| 3. Investigation | 7, 8, 9, 10, 11 | Labs |
| 4. Design | - | |
| 5. Use of Engineering Tools | 3, 6, 7 | Labs |
| 6. Communication | 11 | Labs |
| 7. Individual and Teamwork | - | Labs |
| 8. Professionalism | - | |
| 9. Impact of Engineering on Society and the Environment | 1-10 | Tests, Exams, Labs |
| 10. Ethics and Equity | - | |
| 11. Business & Project Management | - | |
| 12. Life-Long Learning | 3, 6 | Labs |

4.4 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.

4.5 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.

4.6 Relationships with other Courses & Labs

Previous Courses:

CHEM*1040/1050: Chemicals are generally pollutants. Chemical properties are key to pollutant impacts and pollutant treatment and prevention and resource recovery.

CIS*1500: Programming logic.

ENGG*1500: Manipulating variables and equations is an essential skill.

MATH*2270: Simple differential equations are used throughout the course.

Follow-on Required Courses:

ENGG*3180: Air Quality (required for EE's only). Chemical behaviour in the atmosphere relies on ENGG*2560, Fluid Mechanics and Thermodynamics.

ENGG*3590: Water Quality. Chemical behaviour in water relies on ENGG*2560.

ENGG*3470: Mass transfer operations (required for EE's only). An extension of the principles of ENGG*2560 to systems with mass transfer limitations between phases (i.e. non-equilibrium).

ENGG*4340: Solid & Hazardous Waste Management (required for EE's only).

Follow-on Elective Courses:

ENGG*4070: Life Cycle Assessment for Sustainable Design

ENGG*4240: Site Remediation

ENGG*4760: Biological Wastewater Treatment Design

ENGG*4770: Physical & Chemical Wastewater Treatment Design

ENGG*4810: Control of Atmospheric Particulates

ENGG*4820: Atmospheric Emission Control – Combustion Systems

5 TEACHING AND LEARNING ACTIVITIES

5.0 Timetable

Lectures:

M, W, F 12:30 – 13:20 MCLN 102

Tutorials & Labs

| | | | |
|-----------|--------|--------------|-------------------------|
| Monday | Sec 01 | 8:30 – 10:20 | THRN 1002 / 2336 / 1116 |
| Tuesday | Sec 02 | 8:30 – 10:20 | THRN 1002 / 2336 / 1116 |
| Wednesday | Sec 03 | 8:30 – 10:20 | THRN 1002 / 2336 / 1116 |
| Thursday | Sec 04 | 11:30 – 1:20 | THRN 1002 / 2336 / 1116 |
| Friday | Sec 05 | 3:30 – 5:20 | THRN 1002 / 2336 / 1116 |

* you may only attend an alternate tutorial or lab time with prior permission of the instructor

5.1 Lecture Schedule

Lectures

| (Approx) | Lecture Topics | Learning Objectives |
|----------|----------------------------------|---------------------|
| 1 | Introduction | ALL |
| 2-5 | Mass & Energy Balance Principles | 1, 2 |
| 6-18 | Reactors & Chemical Kinetics | 1, 2 |
| 19-21 | Biochemical Kinetics & Reactors | 1, 2 |
| 22-27 | Noise | 4, 5 |
| 28-33 | Equilibrium | 1, 2 |
| 34 | Growth | 1, 2 |
| 35 | Wrap-up, Course Evaluation | ALL |

5.2 Tutorial & Lab Schedule

| Week of | Tutorial | | Lab THRN 1116 |
|--------------|--------------|-------------|------------------|
| | THRN 1002 | THRN 2336 | |
| Jan 11 | Problem Set | | |
| Jan 18 | Problem Sets | | |
| Jan 25 | | | Batch Reactors |
| Feb 1 | Problem Sets | | |
| Feb 8 | | | Reactor Systems |
| Reading Week | | | |
| Feb 22 | | Simulink | |
| Feb 29 | Problem Sets | * | |
| Mar 7 | Problem Sets | * | |
| Mar 14 | Problem Sets | | |
| Mar 21 | | Programming | |
| Mar 28 | Problem Sets | * | |
| Apr 4 | Problem Sets | | |

Note: Friday March 25th is Good Friday – No Tutorial

* Computer lab support may also be provided / used pending the interests of students in each section.

The Physical Noise Lab experiments will be completed outside of scheduled lab times during the period from February 29th to March 11th.

5.3 Lab Schedule

See Section 5.2

5.4 Other Important Dates

Monday, January 11: First day of class
 Monday, February 15 – Friday, February 19: Winter Break
 Friday, March 11: Last drop date – 40th class
 Friday, March 25: Holiday – no classes
 Friday, April 8: Last day of classes

6 LAB SAFETY

6.0 School of Engineering Policy

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.

If the laboratory rules are not followed, consequences will include removing student's access to the lab. If this results in lab work not being completed, the student will receive a grade of 0.

6.1 ENGG*2560 Specific

Pre-Lab Safety Quiz must be passed prior to starting the lab. You will not be permitted to conduct your lab until all team members have individually passed the quiz (on-line courselink). You may be asked equivalent safety questions in the lab and poor responses may lead to you being asked to leave the lab.

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.

7.0 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 Student Accessibility Services as soon as possible.

For more information, contact SAS at [519-824-4120](tel:519-824-4120) ext. 56208, 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, GTA, technician, classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

Professor Stiver grants you permission to record or copy his lectures or his other material and to freely use this material for your use only within ENGG*2560 and any of your other University of Guelph courses (suitable citation is expected). Use of this material beyond the University of Guelph requires further permission.

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>