Faculty of Engineering

GPE 3382A – Fundamentals of Green Process Engineering and Safety
Course Outline 2016-2017

Description
This course reviews the fundamental concepts of green/sustainable process engineering and process safety. The general objectives are for the student to be aware of the environmental and safety issues associated with industrial processes, and to be able to minimize the environmental footprint, risk and hazards of existing industrial chemical processes, design alternative green processes with considerations of economics and safety.

Prerequisites
CBE 2207A/B or GPE 2214A/B, CBE 2224A/B or GPE 2218A/B, ECE 2208A/B or ECE 2238A/B.

Unless you have either the requisites for this course or written special permission from your Dean to enrol in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

Corequisite
CBE 3317

Anti-requisite
CBE 4467A/B.

Contact Hours
3 lecture hours, 1 tutorial hour, 0.5 course.

Instructor
Dr. C. Xu (CMLP 2335) Telephone: 661-2121 ext: 86414 email: cxu6@uwo.ca

Undergraduate Assistant
(TEB 477) Telephone: 519-661-2131 email: cbeundergraduate@uwo.ca

Recommended Textbooks:
Course Notes
Course notes will be available for download from OWL, powered by Sakai.  
https://owl.uwo.ca/portal

Units
SI units will be used in lectures and examinations.

General Learning Objectives

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Classification Introduced/Taught/Evaluated</th>
<th>Level Beginner/Intermediate/Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>A knowledge base for engineering</td>
<td>Taught</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Impact of engineering on society and the environment</td>
<td>Taught and evaluated</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Ethics and equity</td>
<td>Taught and evaluated</td>
<td>Beginner or Intermediate</td>
</tr>
<tr>
<td>Economics and project management</td>
<td>Taught and evaluated</td>
<td>Beginner</td>
</tr>
</tbody>
</table>

Specific Learning Objectives

1. Introduction to green process engineering, sustainable engineering and chemical process safety

At the end of this topic, students should be able to:

- tell what green process engineering is, how it differs from conventional chemical and environmental engineering;
- understand the principles of green chemistry, and use the green chemistry methodologies to design green chemical synthesis pathways;
- know about sustainability and clean production concepts;
- know the concepts of engineering ethics and acceptable risk and inherent safety in plant design.

2. Strategies for waste minimization and pollution prevention

At the end of this topic, students should learn strategies to minimize waste generation:

- in reactors;
- in separation processes;
- in utility systems;
- in plant operations;
- via energy conservation;
- via materials recycling;
- in various unit operations.
4. Evaluating environmental fate and exposures
At the end of this topic, students should:
• be able to estimate environmental persistence and risks of industrially produced chemical compounds.
• know the various methods used to estimate exposures to chemicals.
• be able to use methodologies for designing safer chemicals.

5. Hazards identification and risk assessment
At the end of this topic, students should:
• know various types of risks that can be associated with an industrial process;
• be able to identify hazards;
• know methods to perform risk assessment;
• know safety procedures and methods for design for process safety.

6. Fires and explosions and prevention strategies
At the end of this topic students should know fundamentals of:
• fires and explosions;
• concepts and strategies to prevent fires and explosions;

7. Pressure relief concepts and design
At the end of this topic, students should know fundamentals of:
• pressure relief concepts and design.

Evaluation
The final course mark will be determined as follows:
Assignments 15%
Mid-Term Examinations 35%
Final Examination 50%

The midterm exam will be a 2-hour exam while the final exam is a 3-hour exam covering all aspects of the course. A one-sided “cheat” sheet can be used for the midterm exam while the final exam can use both sides.

Notes
1) Students must pass the final examination to pass this course. Students who fail the final examination will be assigned 48% if the aggregate mark is higher than 50%, or the aggregate mark.
2) Assignments are to be handed into GPE 3382A locker (#448) located in TEB on the specified due date provided by the Instructor.
3) There will be no make-up tests. If you are unable to write a test for medical or compassionate reasons, you must provide the appropriate documentation and the weighting of the mid-year or final exam will be adjusted accordingly. Failure to provide the adequate documentation will result in a mark of 0.
Repeating All Components of the Course
In accordance with Senate and Faculty Policy, students who have failed an Engineering course (i.e. <50%) must repeat all components of the course. No special permissions will be granted enabling a student to retain laboratory, assignment or test marks from previous years. Previously completed assignments and laboratories cannot be resubmitted for grading by the student in subsequent years.

Use of English
In accordance with Senate and Faculty Policy, students may be penalized up to 10% of the marks on all assignments, tests, and examinations for the improper use of English. Additionally, poorly written work with the exception of the final examination may be returned without grading. If resubmission of the work is permitted, it may be graded with marks deducted for poor English and/or late submission.

Attendance
Attendance in lectures, tutorials and labs is mandatory. Any student, in the opinion of the instructor, is absent too frequently from class or laboratory periods in any course, will be reported to the Dean (after due warning has been given). On the recommendation of the Department concerned, and with the permission of the Dean, the student will be debarred from taking the regular examination in the course.

Cheating
University policy states that cheating is a scholastic offence. The commission of a scholastic offence is attended by academic penalties, which might include expulsion from the program. If you are caught cheating, there will be no second warning (see Scholastic Offence Policy in the Western Academic Calendar).

Plagiarism
Students must write their essays and assignments in their own words. Whenever students take an idea or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence (see Scholastic Offence Policy in the Western Academic Calendar).

The University of Western Ontario has software for plagiarism checking. Students may be required to submit their work in electronic form for plagiarism checking.

Conduct
Students are expected to arrive at lectures on time, and to conduct themselves during class in a professional and respectful manner that is not disruptive to others.

Sickness and Other Problems
Students should immediately consult with the instructor if they have any problems that could affect their performance in the course. Where appropriate, the problems should be
documented. The student should seek advice from the Instructor regarding how best to deal with the problem. Failure to notify the Instructor immediately (or as soon as possible thereafter) will have a negative effect on any appeal.

Please contact the course instructor if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.

Notice
Students are responsible for regularly checking their Western email and notices posted through OWL.

Consultation
Students are encouraged to discuss problems with their teaching assistant and/or instructor in tutorial sessions. Office hours will be arranged for the students to see the instructor and teaching assistants. Other individual consultation can be arranged by appointment with the appropriate instructor.

Accreditation (AU) Breakdown
Engineering Science = 50%
Engineering design = 25%
Complementary Studies = 25%

December 15, 2017/cxu