Faculty of Engineering

GPE 4497 – Green Process and Plant Design
Course Outline 2016-2017

Description
Green Process and Plant Design is to prepare GPE students with training experience for application of both chemical engineering and green engineering principles to the design of chemical processes and equipment. This involves the detailed design of all major components/equipment, an estimate of the environmental footprint with highlights of green engineering principles employed, and an economic analysis. Problem formulation, innovative solutions and professional decision-making are emphasized.

Prerequisites
CBE 2220, CBE 2224, CBE/GPE 3315, CBE 3318, CBE 3322, CBE 3323, CBE 3324, CBE 3325, GPE 3382, GPE 3395.

Corequisite
Business Administration 2299E.

Anti-requisite
CBE 4497, CEE 4441, ECE 4416, MME 4499, SE 4450, ES 4499.

Contact Hours
2 lecture hours and 3 tutorial hours, 1.0 course.

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

Undergraduate Assistant
Brandy Hunter (TEB 477) Telephone: 519-661-2131 ext 82131 email: cbeundergraduate@uwo.ca

Recommended Textbook:

Reference Textbook
Reference to other books and articles will be made at the appropriate time during the course.

**Course Notes**
Course notes will be available for download from OWL websites of GPE4497, powered by Sakai. [https://owl.uwo.ca/portal](https://owl.uwo.ca/portal)

**Laboratory**
Depending on the project, minor laboratory work might be necessary.

**Units**
SI units will be used in lectures and examinations.

**General Learning Objectives**

| A knowledge base for engineering | A | Individual and team work | A | Economics and project management | A |
| Problem analysis | A | Communication skills | A | Life-long learning | A |
| Investigation | A | Professionalism | A | |
| Design | A | Impact of engineering on society and the environment | A |
| Use of engineering tools | A | Ethics and equity | B |

**Objectives**
This course introduces students to the design of an industrial process and equipment through creative problem solving and teamwork. It applies the basic skills in both chemical and green engineering and economics that were acquired in other courses in the curriculum. The general objectives are for the student to become able to:

- apply engineering and professional judgement to propose solutions to open-ended design problems.
- formulate problems and apply decision making to evaluate design alternatives.
- identify safety, environmental, green (sustainable), social, legal and economic issues, and their impacts on design decisions.
- develop strong technical communication skills in order to present and defend technical information and design decisions in both written and oral format.

These objectives are accomplished within the framework of a workshop simulating, to the extent possible, to the real world industrial environment. During the workshops, groups of up to six students are given guidance and coaching (interactive learning) to assist in moving forward the design project. Each group of project engineers is assigned to a specific section head (Teaching Assistant).
Specific Learning Objectives
The course is organized to develop the following professional and job related skills for students while applying both chemical and green engineering concepts and principles to an independent study for an industrial design project.

Team Work and Time Management
Students should be able to:
- work in a team as they become more familiar with dynamics of team work and learn to make use of the strengths of team members
- divide a project into tasks and sub-tasks with deadlines and milestones

Information Collection, Analysis and Synthesis
Students should be able to:
- collect information from different sources including literature, industry, equipment suppliers, internet, experts, etc.
- analyze sometimes conflicting information and learn to deal with it

Critical Thinking
Students should be able to:
- develop alternative solutions for the same problem
- compare alternatives based on pre-selected criteria

Engineering Judgment
Students should be able to:
- apply approximations in design calculations based on sound reasoning and documentation
- apply practical considerations to reduce downtime, improve safety and operability of a system being designed
- estimate the economic and environmental impacts of their design

Communication
Students should be able to present their work both orally and in written format as per acceptable standards.

Progress will depend on a number of factors including complexity of the selected process, availability of process information, industrial contacts established by group, etc. Initiative and creativity is required from every student.

This course draws on knowledge, skills and techniques learned in prerequisite and corequisite courses to solve practical engineering problems. It is a capstone course: students need to demonstrate sound design and professional capabilities before they can graduate.

Evaluation
The final course mark will be determined as follows:
Project Definition and Scope 5%
Detailed Flow Plan with Description (grp. mark) 5%
Short-cut Equipment Design 15%
First Oral Presentation (50% ind. mark, 50% grp.) 10%
Final Oral Presentation (60% ind. mark, 40% grp.) 15%
First Design Report (50% ind. mark, 50% grp.) 15%
Final Design Report (60% ind. mark, 40% grp.) 30%

Note
There is 5% mark for participation in workshops (based on the teaching assistant comments). Students must secure a passing mark (>50%) in both the final oral presentation and final design report to pass this course.

1. Design Reports
A design report is due from each group at the end of each term culminating the efforts of the group. The reports will be submitted to the Undergraduate Assistant in TEB 477. Format for design report is given in the course notes in OWL.

First Formal Report due: To be announced
Final Formal Report due: To be announced

2. Oral Presentations
Two oral presentations will be made by each design group, one in each term. Each student will take part in the presentations. Presentation schedule will be distributed in class about two weeks before presentation week.

First Formal Oral Presentation: To be announced
Final Formal Oral Presentation: To be announced

3. Detailed Flow Plan with Description
Each design team will hand in a detailed flow plan of the process drawn on a 60cmX90cm sheet together with a description of the process to its section Teaching Assistant by the due date (to be determined).

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 penalised 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.

**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.

**Attendance**
**Attendance at all lectures, tutorials and laboratories is mandatory.** Any student who, in the opinion of the instructor, is absent too frequently from class, or workshop/tutorial periods 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 making final oral presentation and submission of final design report.

**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 or Department Chair 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 or Department Chair regarding how best to deal with the problem. Failure to notify the Instructor or Department Chair 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.

**Notices**
Students are responsible for regularly checking their Western email and notices posted in front of chief instructor’s offices.

**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**

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complimentary Studies</td>
<td>= 25%</td>
</tr>
<tr>
<td>Engineering Design</td>
<td>= 75%</td>
</tr>
</tbody>
</table>

September 2016/cxu
If, on medical or compassionate grounds, you are unable to write term tests or final examinations or complete course work by the due date, you should follow the instructions listed below. You should understand that academic accommodation will not be granted automatically on request. You must demonstrate to your department (or the Undergraduate Services office if you are in first year) that there are compelling medical or compassionate grounds that can be documented before academic accommodation will be considered. Different regulations apply to term tests, final examinations and late assignments. Read the instructions carefully. (see the 2016 Western Academic Calendar).

A. GENERAL REGULATIONS & PROCEDURES

1. Check the course outline to see if the instructor has a policy for missed tests, examinations, late assignments or attendance.

2. Bring your request for academic accommodation to the attention of the Chair of the department (or the Undergraduate Services office if you are in first year) prior to the scheduled time of the test or final examination or due date of the assignment. If you are unable to contact the relevant person, leave a message with the appropriate department (or Undergraduate Services office, if you are in first year). The addresses, telephone and fax numbers are given at the end of these instructions. Documentation must be provided as soon as possible.

3. If you decide to write a test or an examination you should be prepared to accept the mark you earn. Rewriting tests or examinations or having the value of a test or exam reweighted on a retroactive basis is not permitted.

B. TERM TESTS

1. If you are unable to write a term test, inform your instructor and the Chair of your Department (or the Undergraduate Services Office if you are in first year) prior to the scheduled date of the test. If the instructor is not available, leave a message for him/her at the department office and inform the Chair of the Department (or the Undergraduate Services Office if you are in first year).

2. Be prepared to provide supporting documentation to the Chair and the Undergraduate Services Office (see next page for information on documentation).

3. Discuss with the instructor if and when the test can be rescheduled. N.B. The approval of the Chair (or the Undergraduate Services Office if you are in first year) is required when rescheduling term tests.

C. FINAL EXAMINATIONS

1. If you are unable to write a final examination, contact the Undergraduate Services Office PRIOR TO THE SCHEDULED EXAMINATION TIME to request permission to write a Special Final Examination. If no one is available in the Undergraduate Services Office, leave a message clearly stating your name & student number (please spell your full name).

2. Be prepared to provide the Undergraduate Services Office with supporting documentation (see next page for information on documentation) the next day, or as soon as possible (in cases where students are hospitalized). The following circumstances are not considered grounds for missing a final examination or requesting special examinations: common cold, sleeping in, misreading timetable and travel arrangements.

3. In order to receive permission to write a special examination, you must obtain the approval of the Chair of the Department and the Associate Dean and in order to apply you must sign a "Recommendation for a Special Examination Form" available in the Undergraduate Services Office. The Undergraduate Services Office will then notify the course instructor(s) and reschedule the examination on your behalf.

N.B. It is the student's responsibility to check the date, time and location of the special examination.

D. LATE ASSIGNMENTS

1. Advise the instructor if you are having problems completing the assignment on time (prior to the due date of the assignment).

2. Be prepared to provide documentation if requested by the instructor (see reverse side for information on documentation).

3. If you are granted an extension, establish a due date. The approval of the Chair of your Department (or the Associate Dean if you are in first year) is not required if assignments will be completed prior to the last day of classes.

4. i) Extensions beyond the end of classes must have the consent of the instructor, the department Chair and the Associate Dean. Documentation is mandatory.

   ii) A Recommendation of Incomplete Form must be filled out indicating the work to be completed and the date by which it is due. This form must be signed by the student, the instructor, the department Chair and the Associate Dean.
**SHORT ABSENCES**

If you miss a class due to a minor illness or other problems, check your course outlines for information regarding attendance requirements and make sure you are not missing a test or assignment. Cover any readings and arrange to borrow notes from a classmate.

**EXTENDED ABSENCES**

If you are absent more than one week or if you get too far behind to catch up, you should consider reducing your workload by dropping one or more courses. (Note drop deadlines listed below). You may want to seek advice from the academic counsellor in your Department or the counsellors in the Undergraduate Services Office if you are in first year.

**DOCUMENTATION**

If you consulted an off-campus doctor or Student Health Services regarding your illness or personal problem, you must provide the doctor with a Student Medical Certificate to complete at the time of your visit and then bring it to the Department (or the Undergraduate Services Office if you are in first year). **This note must contain the following information:** severity of illness, effect on academic studies and duration of absence.

**In Case of Serious Illness of a Family Member:** Provide a Student Medical Certificate to your family member's physician to complete and bring it to the Department (or the Undergraduate Services Office if you are in first year).

**In Case of a Death:** Obtain a copy of the death certificate or the notice provided by the funeral director's office. You must include your relationship to the deceased and bring it to the Department (or the Undergraduate Services Office if you are in first year).

**For Other Extenuating Circumstances:** If you are not sure what documentation to provide, ask the Departmental Office (or the Undergraduate Services Office if you are in first year) for direction.

**Note:** Forged notes and certificates will be dealt with severely. To submit a forged document is a scholastic offence (see below).

**ACADEMIC CONCERNS**

You need to know if your instructors have a policy on late penalties, missed tests, etc. This information may be included on the course outlines. If not, ask your instructor(s).

You should also be aware of attendance requirements in some courses. You can be debarred from writing the final examination if your attendance is not satisfactory.

If you are in academic difficulty, check out the minimum requirements for progression in the calendar. If in doubt, see your academic counsellor.

**Calendar References:** Check these regulations in your 2016 Western Academic Calendar available at [www.westerncalendar.uwo.ca](http://www.westerncalendar.uwo.ca).

Absences Due to Illness - page 117  
Academic Accommodations for Students with Disabilities - page 118  
Academic Accommodations for Religious Holidays - page 119  
Incomplete Standing - page 104  
Scheduling of Term Assignments – page 97  
Scholastic Offences - page 113  
Special Examinations - page 132

**Note:** These instructions apply to all students registered in the Faculty of Engineering regardless of whether the courses are offered by the Faculty of Engineering or other faculties in the University.

**Drop Deadlines:**

First term half course (i.e. “A” or “F”): November 5, 2016  
Full courses and full-year half courses (i.e. “E”, “Y” or no suffix): November 30, 2016  
Second term half or second term full course (i.e. “B” or “G”): March 7, 2017

Undergraduate Services Office: SEB 2097 telephone: (519) 661-2130 fax: (519) 661-3757  
Dept. of Chemical and Biochemical Engineering: TEB 477 telephone: (519) 661-2131 fax: (519) 661-3498  
Dept. of Civil and Environmental Engineering: SEB 3005 telephone: (519) 661-2139 fax: (519) 661-3779  
Dept. of Electrical and Computer Engineering, Software Engineering Mechatronics Engineering: TEB 279 telephone: (519) 661-3758 fax: (519) 850-2436  
Dept. of Mechanical and Materials Engineering: SEB 3002 telephone: (519) 661-4122 fax: (519) 661-3020

Revised 29-Sep-16