GPE 4497: Green Process Plant Design
Course Outline (2017 - 2018)

Description
A design is prepared for a device or a full-scale industrial process. This involves the detailed design of all major components, an estimate of the environmental footprint, and an economic analysis. Problem formulation, innovative solutions and professional decision making are emphasized.

Prerequisites: CBE 2220A/B, CBE 2224A/B, GPE 3315A/B, CBE 3322A/B, CBE 3323A/B, CBE 3324A/B, and CBE 3318A/B and GPE 3382A/B or the former CBE 3317Y or CBE 3397.

Unless you have the requisite for this course or written special permission from your Dean to enrol in it, you will 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 if you are dropped from a course for failing to have the necessary prerequisites.

Corequisite(s): n/a

Antirequisite(s): CBE 4497, CEE 4441, ECE 4416, MME 4499, SE 4450, ES 4499, MSE 4499, ECE 4415.

Contact Hours: 2 lecture hours, 3 tutorial hours, 1.0 course

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Recommended Textbooks:

Additional Textbooks:

Course Notes: The notes will be provided by the instructor through the OWL website.

Units: The International System of Units (SI) will be used in this course.
Primary Learning Outcomes

This course teaches students to synthesize and analyze chemical processes and equipment through creative problem solving and teamwork by applying basic chemical engineering principles and economics learned in previous courses. The general objectives for the student are to:

- Apply engineering judgement to propose sound solutions for open-ended design problems.
- Identify design problems and apply decision making to evaluate design alternatives.
- Consider safety, environmental, and economic issues, as well as their impact on design decisions.
- Develop technical communication skills to present and defend decisions in both written and oral formats.
- Recognize the need for life-long learning to keep with the state-of-the-art for design, modifications and improvements in chemical processes.

These objectives are accomplished within the course framework, attempting to simulate a real world industrial environment to the extent possible. During the tutorials, groups of up to five students are given guidance and coaching (interactive learning) to assist in progressing the design project. Each group of project engineers is assigned to a specific section Teaching Assistant and Professor.

Specific Learning Objectives

The course develops professional skills while applying prior engineering knowledge to an industrial design project.

Team Work and Time Management

- Working in a team and becoming familiar with team dynamics to make use of colleagues’ strengths.
- Divide a project into tasks and sub-tasks with deadlines and milestones to schedule and allocate resources.

Information Collection, Analysis and Synthesis

- Gather the required information from sources such as literature, industry, equipment suppliers, etc.
- Analyse occasionally conflicting information and determine an appropriate solution.

Critical Thinking (applied to design process)

- Recognize and compare alternative solutions for a given design problem based on selected criteria.
- Ensure and verify calculations prior to making a recommendation.

Engineering Judgment and Communication

- Identify appropriate approximations in design calculations based on sound reasoning and documentation.
- Apply practical considerations to reduce downtime, improve safety and operability of designed systems.
- Discuss and defend designs both orally and in written format as per acceptable standards.

Engineering Safety and Environmental Considerations

- Incorporate engineering safety and risk analysis in the final process and equipment designs.
- Identify and minimize environmental risks.
- Consider and improve process sustainability based on green principles.

Progress will depend on many factors including the 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 the knowledge, skills and techniques learned in prerequisite and corequisite courses to solve practical engineering problems. It is a finishing course where students need to demonstrate sound design and professional capabilities before they can graduate.
Evaluation

The final course mark will be determined as follows

- Report 1: Project definition and scope  5%
- Report 2: Process flow plan and description 10%
- Report 3: Fall progress report 15%
- Report 4: Individual design 15%
- Report 5: Economics 10%
- Report 6: Final Report 25%
- Fall progress oral presentation 8%
- Final oral presentation 12%

Note: Students must secure a passing mark (> 50%) in both the final oral presentation and final design report to pass this course.

Design Reports
Reports will be submitted electronically on the course OWL site. Requirements for content, formatting and deadlines will be provided on the OWL site. The penalty for late submission of a report is 5% per day.

Oral Presentations
Two oral presentations will be made by each design group, one in each term. Each student must participate in the presentations. Presentation schedule will be distributed in class approximately two weeks before presentations.

Note: If a member of a group is not present in the presentations, the allocated time will be reduced.

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 all lectures, tutorials and laboratories is mandatory. Any student who, 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 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 on the OWL website.

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 = 25 %
Engineering Design = 75 %