Faculty of Engineering

GPE 3395Y – GREEN ENGINEERING LABORATORY
COURSE OUTLINE 2014-2015

Description
This laboratory course applies and integrates selected concepts/theories reviewed in the following THREE (3) courses: Heat Transfer (GPE 3322), Mass Transfer (GPE 3324) and Particulate Operations (GPE 3325), with green engineering applications.

Important Note: The course does NOT include any materials (concepts and laboratories) for the course of Process Control (GPE 3310). Students in the class of GPE 3310 are required to take the same labs as the CBE 3310 class do. Please contact the instructor of GPE 3310 to arrange the labs.

Prerequisites
CBE 2220A/B, CBE 2221A/B, Applied Mathematicss 2411 or 2415, CBE 2291A/B.

Unless you have either the requisites for this course or written special permission from your Dean to enroll 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.

Corequisites
GPE 3322A/B, GPE 3324A/B, GPE 3325A/B.

Antirequisites
None

Contact Hours
6 laboratory hours per week for 2 semesters (Fall and Winter), 0.5 course.

Instructors
Fall term: Dr. C. Xu (CMLP 2335), 519-661-2121 x 86414, email: cxu6@uwo.ca

Laboratory Technicians
Souheil Afara (SEB 1081C) 519-661-2111 ext 88457 email: safara@uwo.ca
Brian Dennis (SEB1083) Telephone: 519-661-2111 ext: 80536 email: bdennis4@uwo.ca

Undergraduate Assistant
(TEB 477) Telephone: 519-661-2131 email: cbeundergraduate@uwo.ca
**Required Text**  
*GPE 3395 Lab Manual*, authored by Dr. Xu.

**Reference Texts**  
Course Notes from 3322A/B, 3324A/B and 3325A/B.

**Laboratories and Project**  
Rooms for laboratories: SEB 1079

The laboratory course applies and integrates the concepts reviewed in heat and mass transfer operations, and particulate operations courses. Training of team work and leadership is one of the key objectives of this course, the labs/projects are all group labs/projects involving 3-6 students per group depending on the size of the class. For the purpose of training, the students are expected to spend 6h/week for approximately 26 weeks (two semesters) working on their labs/projects using equipment that is available in the GPE Laboratory and in the research labs where the TAs are working. Students’ performance will be judged according to the following criteria:

- Amount of time spent in the lab/project (experimental work in the lab, results analysis/reporting)
- Judgment
- Individual and team work
- Quality and amount of the data from the experimental labs
- Quality of the analysis/discussion of the results, relating the results with the concepts reviewed in the relevant courses.

In **Session A (Fall term)**, the students in groups will carry out one of the following 3 pre-designed labs (4 weeks per lab). The groups will rotate the labs and will complete all labs in the Fall term (in the Week-1 for each new lab assigned, the group are requested to submit their proposal for the experimental plan and procedure for the assigned lab to the course instructor by email by Friday of Week-1. The instructor will review and go over the proposed experimental plan and procedure and advised revisions to the group at the beginning of the first class time in the following Week). The report (hardcopy and e-copy) for each lab must be submitted to the instructor at the latest one week after the completion of the lab.

- **Lab 1**: Convective heat transfer enhancement in a stirred tank reactor involving solid particles
- **Lab 2**: Liquid phase mass transfer in a gas-liquid stirred reactor system
- **Lab 3**: Particulate operations - formation, handling and characterization of nanoparticles for heterogeneous catalysts

In **Session B (Winter term)**, the student groups will carry out their own self-chosen green process engineering research projects. The TAs will offer 2-3 small projects in the scope of green process engineering to their group (s) for selection. The group (s) will choose a project of the most interest. They are required to write the project proposal and submit an e-copy to the instructor by email at the latest by **the last day of class in the Fall term**. In Session B, the
groups will secure and prepare experimental materials and equipment, and perform the experiments and collect data, and analyze the results/data and write a formal project report, supervised by the TAs and the instructor. The project report (hardcopy and e-copy) much be submitted by the last day of class in the Winter term.

Units
SI units will be used in lectures and examinations.

General Learning Objectives

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Classification</th>
<th>Level</th>
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</thead>
<tbody>
<tr>
<td>A knowledge base for engineering</td>
<td>Taught</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Problem Analysis</td>
<td>Introduced</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Investigation</td>
<td>Taught and evaluated</td>
<td>Advanced</td>
</tr>
<tr>
<td>Individual/Team work</td>
<td>Taught and evaluated</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Communication Skills</td>
<td>Taught and evaluated</td>
<td>Advanced</td>
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Learning Objectives
Generally, through this course the students are able to perform pre-designed lab experiments and self-chosen green process engineering research projects using the principles and knowledge from the following courses:
- Heat transfer operations (GPE 3322)
- Mass transfer operations (GPE 3324)
- Particulate operations (GPE 3325)

Specifically, students should be able to:
- Perform pre-designed lab experiments following the lab manuals provided;
- Propose self-chosen research projects in the scope of green process engineering, design their own experimental procedure and methods, secure and prepare experimental materials and equipment, and perform the experiments and collect data, supervised by the TAs and the instructor.
- Interpret the experimental results using the principles and knowledge from the relevant courses.
- Present their results and conclusions.

Evaluation
The final course mark will be determined as follows:
- Proposals of Experimental Plan and Procedure for Labs 10%
- Proposal of the self-chosen green process engineering research project 20%
- Efforts in carrying out the labs/project (graded by the TAs) 10%
- Lab/Project reports (on results/discussion/conclusions) 40%
- Oral presentations by group (at the end of Sessions A and B, respectively) 20%
Notes
1) Students must turn in all the above proposal, reports, and make oral presentations to pass this course.
2) The lab/project proposals and reports must be submitted in group. Each group member must take in charge of writing the group proposals/reports for at least one lab/project. The name of the writer, along with a list of student names for the whole group, must be indicated clearly on the title/cover page of each group proposal and report upon submission. Bonus point (5%) may be offered to the writer.
3) The proposals for the labs and the self-chosen GPE research project must be submitted by email to the course instructor by the specified deadline. The instructor will review, correct and approve the proposal. The group shall not start the lab/project without approval of the proposal.
4) A hard copy of the lab/project report must be to the designated GPE3395 locker by the weekend one week after the lab/project has been completed. Meanwhile, an e-copy of the report must also be sent to the course instructor. Mark deduction up to 10% will apply for late submission.

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 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/reports 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.

**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  =  75%
Engineering Design   =  25%

September 6, 2014/cx