

Faculty of Engineering

CBE 3395Y – CHEMICAL ENGINEERING LABORATORY **COURSE OUTLINE 2023-2024**

Description

This laboratory course applies and integrates concepts/theories presented in the following three courses: CBE 3322 (Heat Transfer Operations), CBE 3323 (Staged Operations) and CBE 3324 (Mass Transfer Operations).

Prerequisites

CBE 2220, CBE 2221.

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

CBE/GPE 3322 , CBE 3323 , CBE/GPE 3324 , CBE 3325

Antirequisites

None

Contact Hours

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

Instructors

Dr. Shahzad Barghi, 519-661-2111 x 881275, email: sbarghi2@uwo.ca

Dr. Cedric Briens, 519-661-2111 x 88865, email: cbriens@uwo.ca

Laboratory Technicians

Erin Johnson (CMLP 1322) 519-661-2111 ext. 88457 email: epeter22@uwo.ca

Undergraduate Assistant

Brandy Hunter (TEB 477), Tel: 519-661-2111 ext. 82131, Email: cbeugrad@uwo.ca

Required Text

None

Reference Texts

Course Notes from CBE 3322A/B, CBE3323 A/B, 3324A/B.

Course Notes

CBE 3395 course notes and labs manuals are available for students to download from CBE 3395Y course website on OWL: <https://owl.uwo.ca/portal> (login required).

Units

SI units will be used in lectures and examinations.

General Learning Objectives

Generally, through this course students are able to perform pre-designed and investigation lab experiments in group (4-6 students per group) using the principles and knowledge from the following courses, aiming to integrate and apply selected concepts/theories to chemical engineering process applications:

- Heat transfer operations (CBE 3322)
- Mass transfer operations (CBE 3324)
- Staged Operations (CBE 3323)

Specifically, students should be able to:

- Perform pre-designed lab experiments in group following the lab manuals provided;
 - Note: this learning objective aligns with and is selected for the assessment of the Graduate Attribute: **Individual and team work** (Developed Level). IT 3- Demonstrates ability to contribute to team goals and IT 4- Demonstrates capacity for team leadership.
- Conduct **investigation labs** in group by proposing, designing their own experimental procedure and methods, and performing the experiments and collecting data, supervised by the TAs and the instructor. The investigation lab report has a maximum of 20 pages in single line spacing, excluding the title page and list of references. The report is expected to include the following contents: (1) a title page; (2) a table of contents; (3) an abstract; (4) background introduction; (5) a design of lab experiments (materials, lab equipment needed, detailed experimental procedure and analytical methods); (6) results and discussion; (7) conclusion; (8) a list of references cited.
 - Note: this learning objective aligns with and is selected for the assessment of the Graduate Attribute: **Investigation** (Developed Level). IN2: Demonstrate ability to plan the investigation successfully - whether experimental or analytical, and IN5 – Demonstrate ability to synthesize information to reach valid conclusions.
- Interpret the experimental results using the principles and knowledge from the relevant courses.
- Present their results and conclusions in oral presentations and written reports.
 - Note: this learning objective aligns with and is selected for the assessment of the Graduate Attribute: **Communication Skills** (Developed Level). CS 3: Demonstrate ability to articulate ideas in writing using appropriate technical language, coherence, correct spelling, grammar and syntax, and effective graphical tools; CS 5: Demonstrate the ability to prepare and deliver a professional oral presentation using appropriate materials, language, style and non-verbal communication

Note:

Term A (Fall term) Labs:

Lab 1: Linear and Radial Heat Conduction

Lab 2: Heat Exchangers

Lab 3: Fluidization (minimum fluidization)

Lab 4: Fluidization (heat transfer)

Investigation Lab 1: Cooling towers performance enhancements, heat and mass transfer limitations, design considerations

Term B (Winter term) Labs:

Lab 5: Batch L-L extraction

Lab 6: Leaching

Lab 7: Oxygen transfer

Lab 8: Distillation

Investigation Lab 2: Absorption removal of CO₂ using NaOH solution in a stirred tank reactor — Liquid phase mass transfer enhancement strategies

For each experiment (excluding the investigation lab) the followings should be addressed as applicable:

- 1- Comment on errors involved in the experiment
- 2- Suggest on reducing/eliminating the errors
- 3- Comment of the most challenging parts of the experiment
- 4- Discuss the possible ways to improve quality of the experiment

Evaluation

The final course mark will be determined as follows:

	Term A	Term B
• Lab performance*	15%	15%
• Investigation lab reports	15%	15%
• Regular lab presentations and oral exams	20%	20%
Sub-total	50%	50%

*Details to be reviewed in class

Notes

- 1) Students must pass both Fall Term A and Winter Term B to pass the course. Students who fail one of the terms will be assigned 48% if the aggregate mark is higher than 50%.
- 2) Attendance in the laboratory is mandatory. Students will be evaluated for their attendance and their performance within the laboratory by our TAs/Instructor.
- 3) The investigation lab reports must be submitted electronically in PDF or WORD file by the group leader to his/her OWL Dropbox **by the last day of scheduled classes in each term**. Late reports will NOT be accepted/marked. The reports will be checked for plagiarism using Turnitin – the software provided by The University of Western Ontario. Reports showing plagiarism levels above 35% (excluding bibliographic materials and small word matches) will receive a mark of zero. past the assigned deadline. The reports will be marked by the instructor.
- 4) All 4 regular labs will be presented by each group (in a 40 min slot, or approx. 10 min in average for each lab), followed by a 20 min **oral exam** (with 2-3 questions) for each student in the group.
- 5) If, on medical or compassionate grounds, you are unable to write term tests or final examinations or complete course work (assignments or lab reports) by the due date, you should follow the instructions **at the end of this outline** as per the policy of Western Engineering Undergraduate Services Office. Something in particular different from the previous is that regular doctor's notes will not be accepted; only the Student Medical Certificate will be accepted.

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 = 50%
Engineering Design = 50%

STATEMENT ON GENDER-BASED AND SEXUAL VIOLENCE

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced gender-based or sexual violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts, [here](#). To connect with a case manager or set up an appointment, please contact support@uwo.ca.

INSTRUCTIONS FOR STUDENTS UNABLE TO WRITE TESTS OR EXAMINATIONS OR SUBMIT ASSIGNMENTS AS SCHEDULED

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 relief will not be granted automatically on request. You must demonstrate to your department (or the Undergraduate Services Office) that there are compelling medical or compassionate grounds that can be documented before academic relief will be considered. Different regulations apply to term tests, final examinations and late assignments. Please read the instructions carefully.

A. GENERAL REGULATIONS & PROCEDURES

1. All first-year students will report to the Undergraduate Services Office by submitting the Academic Consideration Request Form, for all instances.
2. If you are an upper year student and you are missing a test/assignment/lab or examination you will report the absence by submitting Academic Consideration Request Form. Absences worth LESS THAN 10% of your mark, will be processed by your department office. If your course work is worth 10% OR MORE of your final grade, your request will be processed by the Undergraduate Services Office.
3. Check the course outline to see if the instructor has a policy for missed tests, examinations, late assignments or attendance.
4. Documentation must be provided as soon as possible. If no one is available in your department office or the Undergraduate Services Office, leave a message clearly stating your name & student number and reason for your call. The department telephone numbers are given at the end of these instructions.
5. 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 examination reweighted on a retroactive basis is not permitted.

B. TERM/MIDTERM TESTS

1. If you are in first year and you are unable to write a midterm/term test, contact the Undergraduate Services Office, SEB 2097 PRIOR to the scheduled date of the test.
2. If you are an upper year student and you are unable to write a midterm/term test, inform your instructor PRIOR to the scheduled date of the test and request relief through the Academic Consideration Request Form. If the instructor is not available, leave a message for him/her at the department office. If the test is worth LESS THAN 10% of your mark, your request for relief will be processed by your department office. If the test is worth MORE THAN 10% of your final grade your request for relief will be processed by the Undergraduate Services Office.
3. Be prepared to attach supporting documentation to the Department Chair and/or the Undergraduate Services Office through the online form (see next page for information on documentation).
4. Discuss with the instructor if and when the test can be rescheduled. The approval of the Chair or the Undergraduate Services Office is required when rescheduling midterm/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 report your absence using the Academic Consideration Request Form and 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.
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, headache, 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 submit an "Application for a Special Exam" form. The Undergraduate Services Office will then notify the course instructor(s) and reschedule the examination on your behalf.

PLEASE NOTE: 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 submit the Academic Consideration Request Form and 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 Assistant Dean, First Year Studies, 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, Undergraduate Studies. 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, Undergraduate Studies.

E. SHORT ABSENCES

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

F. 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 are strongly encouraged to seek advice from your Academic Counsellor in the Undergraduate Services Office.

G. 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). **This note must contain the following information: severity of illness, effect on academic studies and duration of absence. Regular doctor's notes will not be accepted; only the Student Medical Certificate will be accepted.**

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).

H. ACADEMIC CONCERNS

1. 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).
2. **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.**
3. 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 2023 Western Academic Calendar available at www.westerncalendar.uwo.ca.

Absences Due to Illness:

https://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_135

Academic Accommodations for Students with Disabilities:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_10

Academic Accommodations for Religious or Holy Days:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_16

Course Withdrawals:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=6&SelectedCalendar=Live&ArchiveID=#Page_75

Examinations:

<http://www.westerncalendar.uwo.ca/PolicyPages.cfm?PolicyCategoryID=5&command=showCategory&SelectedCalendar=Live&ArchiveID=>

Scheduling of Term Assignments:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=5&SelectedCalendar=Live&ArchiveID=#SubHeading_78

Scholastic Offences:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_20

Student Medical Certificate:

<https://www.eng.uwo.ca/files/undergraduate/student-medical-certificate.pdf>

Engineering Academic Regulations:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=4&SelectedCalendar=Live&ArchiveID=#Page_86

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.

<u>Add Deadlines:</u>	First term half course (i.e. “A” or “F”)	September 15,
2023		
	Full courses and full-year half course (i.e. “E”, “Y” or no suffix)	September 15,
2023		
	Second term half course (i.e. “B” or “G”)	January 16, 2024

<u>Drop Deadlines:</u>	First term half course without penalty (i.e. “A” or “F”)	November
13, 2023		
	Full courses and full-year half courses without penalty (i.e. “E”, “Y” or no suffix)	November 30,
2023		
	Second term half or second term full course without penalty (i.e. “B” or “G”)	March 7,
2024		

Contact Information:

Undergraduate Services Office:	SEB 2097	Phone: 519-661-2130	E-mail: engugrad@uwo.ca
Chemical & Green Process Engineering:	TEB 477	Phone: 519-661-2131	E-mail:
cbeugrad@uwo.ca			
Civil Engineering:	SEB 3005	Phone: 519-661-2139	E-mail:
civil@uwo.ca			
Computer, Electrical, Mechatronic Systems & Software Engineering	TEB 279	Phone: 519-661-3758	E-mail: eceugrad@uwo.ca
Integrated Engineering	ACEB 2410	Phone: 519-661-6725	E-mail:
engceli@uwo.ca			
Mechanical Engineering:	SEB 3002	Phone: 519-661-4122	E-mail:
mmeundergraduate@uwo.ca			