

Course Outline

Industrial Separation Processes, CHEM ENG 4M03

Term I, 2025/2026

INSTRUCTOR: Dr Raja Ghosh

TEACHING ASSISTANT/S: Shrisha Srinivasa and Adrian Foell

LECTURES: 2 hrs per week

TUTORIALS: 2 hrs per week

OFFICIAL DESCRIPTION: Overview of industrial separation processes, liquid-liquid extraction, adsorption, filtration, membrane separations, and separations applicable to the water and energy industries.

TEXTBOOK: There is no official course textbook. Instead, an extensive list of references (many of which will be posted on Avenue) for each topic will be given.

COURSE DELIVERY:

- Lectures will be in-person only (there will be no broadcasting or recording of regular lectures or tutorials)
- Lecture slides and any additional notes will be posted on Avenue
- Tutorials will in-person only

MATERIAL AVAILABLE ON AVENUE:

- Course outline
- Lecture slides
- Tutorial notifications
- Assignment notifications
- Assignment drop-box

USE OF MS-TEAMS:

- An MS Team for 4M03 will be set up at the start of Term.
- Office hours will be conducted using MS-Teams.
- Communications through MS Teams is allowed, but direct email to instructor or TA is the preferred option
- In exceptional circumstances, when the instructor or the TA is unable to deliver a lecture or a tutorial in-person, there is the option to switch to MS Teams (for those lectures/tutorials only). But such switch will be restricted to exceptional circumstances only. Prior communication for this will be provided.

ASSESSMENT:

- 5 Assignments @6% = 30%
- Mid-term exam = 15%

- Tutorial participation = 5 % (For a select number of tutorials)
- Final exam = 50%

COURSE CONTENT:

1. Overview of separation processes; including:
 - a. Economic significance
 - b. Guidelines for sequencing of separation processes
 - c. Use of process simulators
2. Characterization of molecules, macromolecules, particles, and microorganisms
3. Liquid-Liquid Extraction
4. Membrane-based processes (Reverse Osmosis, Nanofiltration, Ultrafiltration, & Microfiltration)
5. Sorption processes (Adsorption & Ion Exchange)
6. Sedimentation & Centrifugation (including coagulation and flocculation)

*Order of topics is subject to change at the discretion of the instructor.

PREREQUISITE: CHEM ENG 2004, CHEMENG 3A04, and CHEMENG 3M04.

ADDITIONAL INFORMATION:

- Assignments (pdf file) have to be submitted in the respective drop-box provided in Avenue. A drop-box will be closed at its submission deadline. No exceptions (other than those under the purview of SAS) will be made for assignment deadlines.
- Mid-term and Final exams will be in-person
- The assignments and midterm are completely optional – thus no MSAFs are needed, and no makeups are allowed. For any evaluation you choose not to complete, the associated weight will simply be added to the final exam. No notice (i.e. email to the instructor) is needed if you choose not to complete the midterm and/or an assignment(s).
- No sharing of ANY work may be done for assignments. This includes handwritten documents and electronic files of any type. Reusing solutions from previous years will be considered plagiarism.
- Please ensure that you have read the University's academic integrity policy (part of which is reproduced below).
- For those assignments that can be completed in groups of no more than 2.
 - You and your partner will receive the greatest benefit if you each do all the questions yourselves. Arrange to meet and review your solutions, discussing various approaches.
 - You are defeating the purpose of the group-based assignment if you simply divide the assignment into sections, one for each group member. This is definitely not recommended, because you are losing out on the learning opportunity of seeing your mistakes and your partner's mistakes, and learning from them.
 - Assemble and post to AVENUE a single submission (in PDF format) with both names & student numbers clearly identified at the top of the first page. The grade assigned for each submission will be given to both members of the group.
- Any paper-based materials (textbooks, notes, etc.) and the McMaster-approved calculator are allowed during the midterm and the final exam.
- SAS accommodation: Any request for SAS accommodation for reasonable deadline extension has to be made by email ahead of pertinent deadline. Please attach a copy of the accommodation letter provided by SAS.

- The final grade percentage will be converted to letter grades using the Registrar's recommended procedure.

APPROVED ADVISORY STATEMENTS

Academic Integrity:

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity. It is your responsibility to understand what constitutes academic dishonesty.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g., the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at <https://secretariat.mcmaster.ca/university-policies-proceduresguidelines/>

The following illustrates only three forms of academic dishonesty:

- plagiarism, e.g., the submission of work that is not one's own or for which other credit has been obtained.
- improper collaboration in group work.
- copying or using unauthorized aids in tests and examinations.

Authenticity / Plagiarism:

Some courses may use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g., Avenue to Learn, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com please go to www.mcmaster.ca/academicintegrity.

Courses with an On-line Element:

Some courses may use on-line elements (e.g., e-mail, Avenue to Learn, LearnLink, web pages, capa, Moodle, ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using these elements, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the

same course. The available information is dependent on the technology used. Continuation in a course that uses on-line elements will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure, please discuss this with the course instructor.

Online Proctoring:

Some courses may use online proctoring software for tests and exams. This software may require students to turn on their video camera, present identification, monitor and record their computer activities, and/or lock/restrict their browser or other applications/software during tests or exams. This software may be required to be installed before the test/exam begins.

Conduct Expectations:

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the Code of Student Rights & Responsibilities (the “Code”). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, whether in person or online.

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g., use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students’ access to these platforms.

Academic Accommodation of Students with Disabilities:

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) at 905-525-9140 ext. 28652 or sas@mcmaster.ca to make arrangements with a Program Coordinator. For further information, consult McMaster University’s Academic Accommodation of Students with Disabilities policy.

Requests for Relief for Missed Academic Term Work:

In the event of an absence for medical or other reasons, students should review and follow the Policy on Requests for Relief for Missed Academic Term Work.

Academic Accommodation for Religious, Indigenous, or Spiritual Observances (RISO):

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students should submit their request to their Faculty Office normally within 10 working days of the beginning of term in which they anticipate a need for accommodation or to the Registrar’s Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

Copyright and Recording:

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, including lectures by University instructors.

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

Extreme Circumstances:

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, Avenue to Learn and/or McMaster email.