CHEMENG 3TP6
Transport Phenomena

Course Outline

Fall 2025

Disclaimer:

We, the instructional team, respectfully acknowledge that McMaster University is located on the traditional territories of the Mississauga and Haudenosaunee nations, and within the lands protected by the "Dish with One Spoon" wampum agreement. Wampum belts are beads bound onto strings which narrate Haudenosaunee history, tradition, and laws. The "Dish with One Spoon" wampum was created to bind the nations of the Haudenosaunee Confederacy to the Great Law of Peace. The "Dish" represents the shared land, while "One Spoon" reinforces the idea of sharing and peace.

We also consider this classroom to be a place where you will be treated with respect, and we welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability, and other visible and non-visible differences. All members of this class are expected to contribute to a respectful, welcoming, and inclusive environment for every other member of the class. We will gladly honor your request to address you by an alternate name or gender pronoun. Please advise us of this preference early in the semester so that we may make appropriate changes to our records.

We have a goal to create a safe environment, where you should feel comfortable bringing forward or discussing any concerns, issues or suggestions regarding the delivery or inclusiveness of this course. Do not hesitate to reach out to us; we want to make your learning experience as positive as possible.

Instructional Team:

Instructors:

Dr. Zeinab Hosseinidoust (doust@mcmaster.ca)

Dr. Shelir Ebrahimi (shelir.ebrahimi@mcmaster.ca)

Teaching Assistant: TBA on Avenue

CHEMENG 3TP6: Transport Phenomena

This course will cover the principal physics of both heat and mass transfer including the principles of conservation of energy, a detailed study for how molecules move and mathematically modelling these scenarios. This course will cover the similarities between the two phenomena and how they can be applied to real world chemical engineering examples.
Prerequisite(s): CHEMENG 2F04, and CHEMENG 2O04; or Permission of the Department
Antirequisite(s): CHEMENG 3M04, CHEMENG 3A04, MATLS 3TP4, MATLS 3LP3

Intended Learning Outcomes and CEAB Indicators

Based on the Learning Outcomes (LOs) of the course, by the end of this course, the students should be able to:

1. Demonstrate the knowledge of the principles of conservation of mass and energy.
2. Explain the fundamental physics of mass and heat transport phenomena using theoretical and semi-empirical mathematical models.
3. Identify and use the best empirical models/equation to define transfer rate coefficients.
4. Develop the mathematical descriptions of steady state and unsteady state heat and mass transport in various geometries and states of nature.
5. Demonstrate how to combine the fundamental physics concepts with mathematical continuity models to predict the transport phenomena.
6. Compare and contrast steady state and unsteady state transport.
7. Connect the theoretical applications of the transport phenomena to the most relevant chemical engineering applications.
8. Properly communicate the technical learning in a written document.

The following CEAB (Canadian Engineering Accreditation Board) indicators will be addressed within CHEMENG 3TP6. The learning outcomes are mapped with indicators and specific deliverables of the course will be used to evaluate students for each LO as well as indicator.

CEAB Indicator and IDA Level	Learning Outcomes
1.2 Competence in Natural Sciences (D)	LO 1, 2, 3
2.1 Identifies and states reasonable assumptions and suitable engineering fundamentals, before proposing a solution path to a problem (I)	LO 3, 4
4.1 Defines the problem by identifying relevant context, constraints, and prior approaches before exploring potential design solutions (D)	LO5, 6, 7
7.2 Composes an effective written document for the intended audience.	LO8

Class Schedule:

Lectures

Mondays & Thursdays: 4:30pm to 6:20pm

Tutorials: Please check your own MOSAIC schedule.

- T01 & T03: Mondays & Wednesdays, 8:30am to 10:30am
- T02: Mondays & Wednesdays, 10:30am to 12:30pm.

Office Hours:

TA's will each be available for 1 hr/week, that means you have 5 hours of TA time each week. We communicate with other courses instructors to make sure there won't be major conflicts. The office hours and location will be announced on Avenue during the first week of classes. Please note that TA office hours may change during the semester. All changes will be announced on Avenue and during the lectures. Depending the schedule, the last 30 minutes of each tutorial is may also be treated as office hours, by designated TA of that tutorial section.

Office hours with the instructor will be arranged on a case-by-case basis and can be scheduled via email.

Course Resources

CHEMENG 3TP6 will use an Avenue to Learn (A2L) site which students can access via their MacID and password. The course A2L site is an important means of communication between the teaching team and the class and should be consulted regularly. The instructors reserve the right to modify elements of the course during the term. If either dates or deadlines must be modified, reasonable notice and communication with students will be given, with explanation, and the opportunity to comment on changes will be possible. All important changes will also be announced in class. Course announcements (including important due dates), lecture schedules, notes and other important course information will be posted on the course shell on A2L. **Students are solely responsible for keeping up to date with all course announcements, instructional materials, and due dates**. Students should inform the course coordinator if they encounter problems with the course A2L site.

A discussion board is also available to post questions about the course and will be monitored by the instructor and the TAs every day between 12-1pm. Questions regarding course material should be posted on the discussion board, not e-mailed individually to the professor, so the entire class can benefit from the answers. Discussion Board is organized into Forums and topics where each assignment, midterm, and exam has a dedicated discussion board. Posting your questions under the appropriate topic ensures a timelier response. Questions regarding individual issues in the course may be directed by e-mail to the instructor (use Avenue Mail) or the Tas.

Commented [SE1]: Not sure what's reasonable, feel free to change if you want.

Commented [HZ2R1]: changed to one hr

Text books:

- Transport Processes and Separation Process Principles, by C. J. Geankoplis, 5th edition
- Fundamentals of Heat and Mass Transfer, 8th edition, Theodore L. Bergman, Adrienne S. Lavine, Frank P. Incorporate, David P. DeWitt. Wiley and Sons

Grade Distribution

To pass the course, you need to receive 50% or more on your overall grade. Table below shows the grade distribution. "Group Review Exam" is meant to prepare you for the final exam after the reviews session. Writing this exam is optional, if you do not write the "Group Review Exam", it is OK, your final exam will be 50%. If your final exam mark is better than "Group Review Exam", your final exam will be 50% and "Group Review Exam" will be eliminated from your marking scheme.

Item	Weight
Tutorials	No assigned marks, there are there to help you practice, learn better and be more prepared for the exams.
Assignments – 4 in total	20%
Test 1	15%
Test 2	15%
Group Review Exam	10%
Final Exam (cumulative)	40%

Course Grading and Policies:

Assignments:

Here is the tentative schedule for the assignments. Please note that depending on the flow of the course, these deadlines might be modified. Any changes will be communicated with students via Avenue page in a timely manner. All assignments are due at 11:59pm.

- Assignment 1: Released on Friday, September 12. Due on Friday, September 19th.
- Assignment 2: Released on Friday, September 26. Due on Friday, October 3rd.
- Assignment 3: Released on Friday, October 24. Due on Friday, October 31st.
- Assignment 4: Released on Friday, November 14th. Due on Friday, November 21st.

Assignments are to prepare you for the tests, and final examination. Assignments can be submitted individually or in a group of 3 to 5. If students decide to work on an assignment in a group, one person on behalf of the group should submit the work. Do not submit multiple versions of the same assignment. Individual submission based on a group work, will be considered a plagiarism, and will be reported to Academic Integrity Office, will result in a grade of zero for the assessment.

Solutions that are identical or close to identical will be penalized and the students will be reported to Academic Integrity Office. The full name and student number of all members of the group should be stated on the cover page – else no mark will be given.

Please ensure all assignments are legible otherwise the TAs may not be able to provide credit. Do not use a third-party site for solutions such as CHEGG or Course Hero. The professors and TAs have access to these websites. Any use of these resources is considered academic misconduct.

All assignments of the course are due by 11:59pm (EST) on the designated due date and must be submitted to the appropriate A2L assignment Dropbox. For all of Avenue submissions there is a 2-hour of grace period. After that there will be 20% penalty per each day of late submissions for the next 48 hours. Deliverables will receive a grade of zero if they are late for more than 48 hours, as the solutions need to be released to students. Any submission with wrong convention name or file format, submission to wrong Dropbox, will lose 10% (each) of the deliverables' mark. If a student wishes to use their SAS accommodations for the assignments, they need to inform the instructors at least 48 hours before the deadline. Any request after that will not be granted as solutions need to be released to other students.

Tests and Exam:

The tests and exam are open book and open notes. Only one electronic device can be used for the exam, and that cannot be a cell phone. The electronic device can not be connected to internet during the exam time. Any calculator may be used for midterm tests and the final exam, as long as it does not have the capability of being connected to the internet. No cellphone calculators.

The tests and exams are heavily invigilated. Any internet connects, chats, or any use of the device outside the scope of the exam will be reported to the Academic Integrity Office and will result in a grade of zero for the assessment.

Exams not written in pen will not be considered for re-marking. Each non-multiple-choice question can receive partial credit for attempted solutions. Show your work, including proper units, otherwise you will not receive any credit.

The following dates/time are booked for tests 1 & 2. They are during the lecture time so you do not have any course conflict. Please mark them on your calendar as these dates will not be changed.

Test 1: October 9th 4:30pm

Test 2: November 20th 4:30pm

MSAF and Appeal:

- MSAFs are not accepted before the due date of the deliverables, or before exam time. MSAF requests should be submitted "after" and within one week of missed work. The weight of any MSAF'ed item will be transferred to the final exam.
- All queries or appeals of marks received on course work should be directed to Dr. Ebrahimi or Dr. Hosseinidoust no later than one week after releasing the grades.

Use of Generative AI

Students are not permitted to use generative AI in this course. In alignment with McMaster academic integrity policy, it "shall be an offence knowingly to … submit academic work for assessment that was purchased or acquired from another source". This includes work created by generative AI tools. Also state in the policy is the following, "Contract Cheating is the act of "outsourcing of student work to third parties" (Lancaster & Clarke, 2016, p. 639) with or without payment." Using Generative AI tools is a form of contract cheating. Charges of academic dishonesty will be brought forward to the Office of Academic Integrity.

The P.R.O.C.E.S.S.

As some of you may already be aware, the department of Chemical Engineering has a storied history of education. In addition to teaching and learning, the department is proud of our graduates not only for their academic success, but their more intrinsic traits that make them respected members of the engineering community.

Recently, several high-ranking graduates from the McMaster Chemical Engineering Program employed in various industries were interviewed to ask what traits they look for when hiring for engineering positions. Using this information, the department would like to present to you the **PROCESS**: a code of conduct that we hope will guide our students throughout this program and their careers to come.

- **P**rofessionalism
- **R**esponsibility
- **O**wnership
- **C**uriosity
- **E**mpathy
- **S**elflessness
- **S**ervice

It is up to YOU to interpret these traits and apply them to your time at McMaster and your career as you see fit. These traits will not be assessed for grades but will be strongly encouraged throughout your time at McMaster. We hope that you identify with these character traits and what they mean to you, and that you **trust the process**.

Course Outline - 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-procedures-guidelines/

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 Detection

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 *McMaster Student Absence Form Policy (MSAF Policy)*.

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 ten (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.