

ChE 204

Introduction to Transport Phenomena

Module 0

Introduction

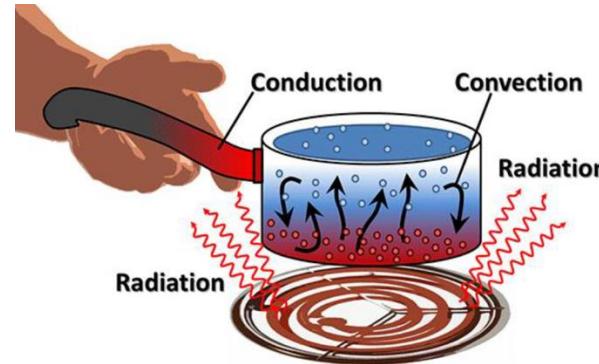
- 1.1. What are transport phenomena?
- 1.2. Why do we study them?
- 1.3. Overview of the course
- 1.4. Calendar for 2025

1.1. What are transport phenomena?

Fluid Mechanics



Heat Transport



Mass Transport



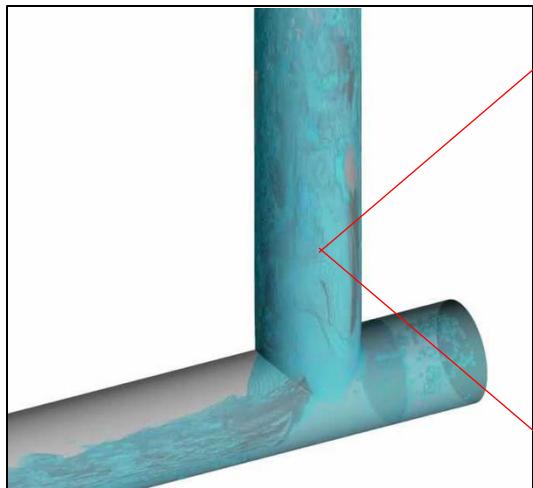
Momentum Transport



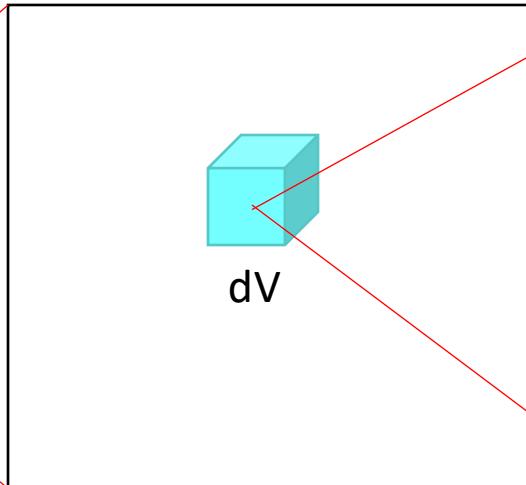
1.1. What are transport phenomena?

Transport phenomena are studied at different length scales

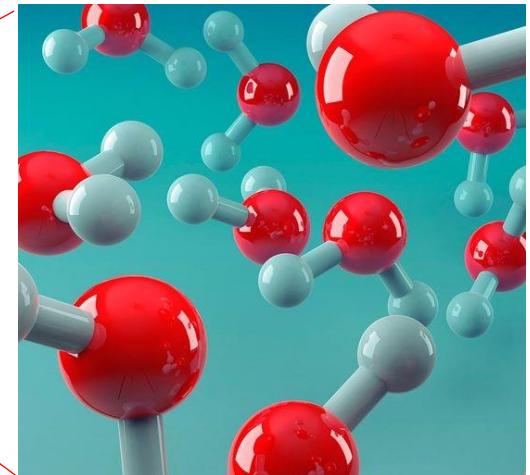
Macroscopic view



Microscopic view



Molecular view



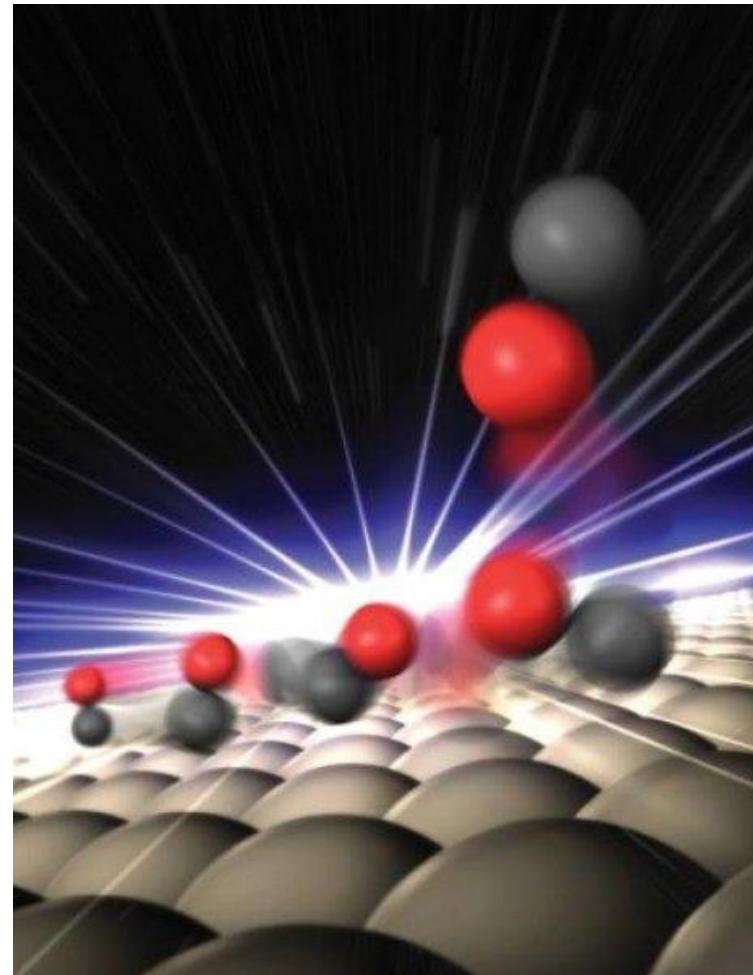
1.2. Why do we study them?

Transport phenomena are important for chemists and chemical engineers

Chemical Industry



Chemical synthesis (i.e. nanoparticles, precipitation reactions, catalysis)



1.3. Overview of the course

→ Fluid Mechanics (Macroscopic view)

Module 1: Bernoulli's Equation

Module 2: Advective transport of mass and momentum

→ Microscopic view

Module 3: Transport of Heat (Fourier's Law)

Module 4: Transport of Mass (Fick's Law)

Module 5: Transport of Momentum (Newton's Law)

→ Molecular view

Only a few slides during the course

1.3. Overview of the course

Supporting material

All the lectures, exercises and solution to the exercises will be uploaded in the Moodle page: <https://moodle.epfl.ch/enrol/index.php?id=15322>

Media Space <https://mediaspace.epfl.ch/channel/ChE-204+Introduction+to+transport+phenomena/29694>

Books

Çengel, Cimbala “Fluid Mechanics”

Wilkes “Fluid Mechanics for Chemical Engineers”

Bird, Stewart, Lightfoot, Klingenberg “Introductory Transport Phenomena”

Incropera/DeWitt/Bergan/Lavine “Fundamentals of Heat and Mass Transport”

1.4. Calendar for 2025

Date	Lectures (8:15-10:00 Wed, MED 0 1418)	Exercises (17:15-18:00 Thurs, CE 1 101)
19/02/2025	1.1 to 1.5 (Bernoulli)	1.2 and 1.4
26/02/2025	1.6 and Module 2	1.7 and 2.2
05/03/2025	Fourier's Law (3.1-3.2)	2.3 and 3.1
12/03/2025	Newton's Law (3.3-3.4)	3.2 and 3.3
19/03/2025	Heat Exchangers (3.5, 3.6, 3.7)	3.5
26/03/2025	Simulation Mid-Term Exam	questions
02/04/2025	Mid-Term Exam (8:00-10:00, room tbd)	
09/04/2025	Fick's Law (4.1 to 4.3)	4.1 and 4.2
16/04/2025	Transport in binary systems and across interfaces (4.4 to 4.6)	4.4, 4.5 and 4.6
23/04/2025	Spring break	
30/04/2025	Newton's Law of Viscosity (5.0-5.2)	5.1-5.3
07/05/2025	Analogies between transports (5.3, 5.4)	Recap 4-5
14/05/2025	Exam preparation (no lecture or exercise hour)	
21/05/2025	Simulation final exam	questions
28/05/2024	Final Exam (07:00-10:00 or 08:00-11:00 if possible, room tbd)	