

Chemistry 2384B: Microscopic Phenomena

Course Outline (Winter 2022/23)

Instructor: Lars Konermann

Lectures: Monday, Wednesday, Friday, 10:30 a.m. – 11:20 a.m.
VAC-100 (John Labatt Visual Arts Centre)

Recommended texts – useful but not required:

- *Physical Chemistry*, 11th Edition, by Atkins/dePaula/Keeler (Oxford University Press, 2018). Other editions are also OK.
- *Molecular Driving Forces*, 2nd Edition, by Dill/Bromberg (Garland Science, 2010).

On-line Resources: Notes and assignments will be available online through OWL in pdf format. You have to print these notes, or you can save them to a laptop/tablet where you can annotate them. The lecture notes have lots of blank spaces that we will fill in together in class.

You Will Also Need: The current Chem2384B Lab Manual. It is available for sale at the Western Book Store. Only the latest version is acceptable, because there have been several updates for this year. A Student Lab Notebook is required as well, which is also for sale at the Western Book Store. If you already have a Student Lab Notebook from other courses, it is ok to use it for this course.

Office Hours: Will be announced in class.

Evaluation:

Assignments	(approximately 7 in total)	10%
Labs	(approximately 5 in total)	10%
Midterm 1	Friday, February 10, in-class	20%
Midterm 2	Friday, March 10, in-class	20%
Final Exam	(date and time will be set by the Registrar)	40%

Missed Labs/Assignments: You are allowed to miss one assignment and one lab without an excuse and without penalty. For students that complete all assignments/labs, the assignment/lab with the lowest mark will be dropped. If you miss more than one lab or assignment, please contact the academic counselling office and provide your documentation to *them*. The academic counselling office will then contact the course instructor. *There will be no make-up labs or assignments.*

Regardless of circumstances, if you miss more than half of the labs (or more than half of the assignments), you will not pass the course.

Missed Midterm: If you miss a midterm test, you must apply for academic consideration by providing valid medical or supporting documentation to the academic counselling office. If approved, the weight of the missed midterm will be transferred to the other course components. *There will be no make-up midterm tests.*

Missed Final Exam: If you miss the final exam, contact the academic counselling office as soon as possible. They will assess your eligibility to write the makeup final exam.

Academic Calendar Course Description: Aspects of microscopic chemistry are covered, including the introduction to statistical mechanics and its connection with thermodynamics, description of the kinetic theory in gas and liquid phases, chemical dynamics, kinetics, diffusion, and transport processes.

Detailed List of Topics:

Chapter 1: Relationship between this course, Thermodynamics (Chem2374A), and Quantum Mechanics (3374A).

Chapter 2: Thermodynamic vs. statistical definition of entropy, random coils.

Chapter 3: Boltzmann distribution, different types of energy levels, Maxwell-Boltzmann distribution, microstates vs. macrostates, chemical equilibrium, two-state protein (un)folding.

Chapter 4: Basic concepts of kinetics, reaction rates, rate laws and rate constants, Arrhenius equation, transition state theory, energy landscapes, integration of various rate equations, kinetic intermediates.

Chapter 5: Basic concepts of diffusion, diffusion in one-two-three dimensions.

Prerequisite: Chemistry 2374A (Thermodynamics)

Antirequisite: Chemistry 2214A/B (Physical Chemistry for Life Sciences)

Use of Electronic Devices: On tests and exams, only basic scientific calculators are allowed; all other devices (cell phones, laptops, tablets, cameras, etc.) are prohibited.

A few mandatory disclaimers:

Accommodation and Accessibility

Religious Accommodation

When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at <https://multiculturalcalendar.com/ecal/index.php?s=c-univwo>.

Accommodation Policies

Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf.

Academic Policies

The website for Registrarial Services is <http://www.registrar.uwo.ca>.

In accordance with policy,

https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf,

the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at their official university address is attended to in a timely manner.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_und_ergrad.pdf.

Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on adding/dropping courses, academic considerations for absences, appeals,

exam conflicts, and many other academic related matters:
<https://www.uwo.ca/sci/counselling/>.

Students who are in emotional/mental distress should refer to Mental Health@Western (<https://uwo.ca/health/>) for a complete list of options about how to obtain help.

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 sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Learning-skills counsellors at the Student Development Centre (<https://learning.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Additional student-run support services are offered by the USC, <https://westernusc.ca/services/>.