

Chemistry 2384B Course Outline

1. Course Information

Course name: Chemistry 2384B, Microscopic Phenomena (Winter 2023/2024)

Lectures: [REDACTED]

Location: [REDACTED]

Lab: [REDACTED]

Prerequisite: Chemistry 2374A (Thermodynamics)

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

Unless you have either the requisites for this course or written special permission from your **Dean's Designate (Department/Program Counsellors and Science Academic Counselling)** 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 if you are dropped from a course for failing to have the necessary prerequisites.

2. Instructor Information

Instructors	Email	Office	Phone	Office Hours
Dr Tsun Kong Sham (Instructor, coordinator)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Dr Christopher Levy (Lab instructor)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Evelyn Mackay-Barr Lab: Raman Problem set 1 – 4	[REDACTED]			
Karsra Hanifi Lab: Electrochem, stop-flow Problem set: 5– 6 Masha	[REDACTED]			
D.O. Bolagh Lab: I ₂ and protein U-F Problem: set 7 – 8	[REDACTED]			

Students must use their Western (@uwo.ca) email addresses when contacting their instructors.

Office hour: Tue. 2-4 pm

3. Course Syllabus, Schedule, Delivery Mode

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.

Learning outcome

The students will learn thermodynamics (Chem2374A) from a microscopic perspective using Boltzmann's distribution and statistical mechanics; they will also learn the connection between thermodynamics and chemical kinetics as well as transport properties in solution. In addition, the lab provides training for the students to gain experimental skill in techniques including electrochemistry, kinetics, and spectroscopy that will benefit them moving forward.

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.

Important Dates

Classes begin: September January 8, 2024

Winter Reading Week: February 17 – 25, 2024

Classes end: April 8, 2024

Exam period: April 11 – 30, 2024

Contingency plan

Although the intent is for this course to be delivered in person, should any university-declared emergency require some or all the course to be delivered online, either synchronously or asynchronously, the course will adapt accordingly. The grading scheme will **not** change. Any assessments affected will be conducted online as determined by the course instructor.

4. Course Materials

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).

Online Resources: Notes and assignments will be available online through OWL in pdf format. You must print these notes, or you can save them to a laptop/tablet where you can annotate them. The lecture notes are power point slides. They will be posted on OWL prior to class as appropriate.

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.

Use of electronic devices. Only basic scientific calculators are permitted on tests and exams. All other electronic devices (cell phones, laptops, tablets, cameras, etc.) are prohibited. Students found in possession of prohibited devices will receive a mark of ZERO for the entire test or exam.

Students are responsible for checking the course OWL site (<http://owl.uwo.ca>) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class.

All course material will be posted to OWL: <http://owl.uwo.ca>.

If students need assistance with the course OWL site, they can seek support on the OWL Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

5. Methods of Evaluation

Assignments	(approximately 8 in total)	10%
Labs	(approximately 5 in total)	10%

Midterm 1	Friday, February 9, in-class	20%
Midterm 2	Friday, March 8, in-class	20%
Final Exam	(date and time will be set by the Registrar)	40%

6. Student Absences

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 receive a course grade of not greater than 40%, even if the calculated grade is higher. For students with valid excuses, the only remedy against an F in such cases would be to apply for an INC grade through the Dean's Office and complete the missed work the next time the course is offered.*

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.*

If you are unable to meet a course requirement due to illness or other serious circumstances, please follow the procedures below.

Assessments worth 10% or more of the overall course grade:

For work totalling 10% or more of the final course grade, you must provide valid medical or supporting documentation to the Academic Counselling Office of your Faculty of Registration as soon as possible. For further information, please consult the University's medical illness policy at

https://uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration.pdf

The Student Medical Certificate is available at

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf.

Absences from Final Examinations

If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you can do so. They will assess your eligibility to write the Special Examination (the name given by the University to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (e.g., more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period).

If a student fails to write a scheduled Special Examination, the date of the next Special Examination (if granted) normally will be the scheduled date for the final exam the next time this course is offered. The maximum course load for that term will be reduced by the credit of the course(s) for which the final examination has been deferred. See the Academic Calendar for details (under [Special Examinations](#)).

7. 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.

8. Academic Policies

The website for Registration 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.

Electronic calculators will be permitted on tests and exams.

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_undergrad.pdf.

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

9. 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.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Accessible Education at

http://academicsupport.uwo.ca/accessible_education/index.html

if you have any questions regarding accommodations.