

WESTERN UNIVERSITY
DEPARTMENT OF CHEMISTRY

CHEM 2274A – Physical Chemistry I: Thermodynamics & Kinetics

COURSE OUTLINE 2024

Welcome to CHEM 2274A!

1. Course Information

Lecture hours: [REDACTED]

Location: [REDACTED]

Labs: Thursday 2:30 – 5:30 pm and Friday 2:30-5:30 pm. See separate document with detailed lab schedule on experiments and location. The labs start on the week of September 16. The first session will take place on Thursday, September 19.

Delivery Mode: In-person

Brief course description: Foundations of classical physical chemistry. Topics include chemical thermodynamics, quantitative description of phase transitions and chemical equilibrium, chemical kinetics, reaction dynamics, diffusion and transport processes.

Prerequisites: Chemistry 1301A/B, Chemistry 1302A/B, 0.5 course from Calculus 1000 A/B, Calculus 1500A/B, Numerical and Mathematical Methods 1412A/B, and any other 0.5 course at the 1000-level from Calculus, Applied Mathematics, Mathematics, or Numerical and Mathematical Methods. Integrated Science 1001X may be used as a substitute for the combination of Chemistry 1302A/B and Calculus 1301A/B.

Anti-requisites: Chemistry 2214A/B, the former Chemistry 2374A.

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 in the event that you are dropped from a course for failing to have the necessary prerequisites.

2. Instructor and Teaching Assistants Information

Instructors	E-mail	Office	Phone	Office hours
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3. Course Syllabus

Learning Outcomes

1. Knowledge of Scientific Principles: Be able to describe the fundamental scientific principles of thermodynamics and kinetics and apply these principles in assignments, discussions on/off line and new problems.
2. Knowledge of Methods: Obtain problem-solving skills in physical chemistry by solving assignments, quizzes and on/off-line discussions and lecture material.
3. Application of Knowledge: Be able to apply the knowledge in order to predict and rationalize the physical and chemical properties of systems, the direction in which chemical and physical processes proceed, transport properties of materials and rate laws.
4. Communication: Be able to prepare logical and concise written reports via training in quizzes and assignments.
5. Awareness of Knowledge Limits: Recognize assumptions and limitations in the scientific models and their possible impact on the results by training on case studies, lectures, assignments, quizzes.
6. Autonomy and Professional Capacity: (i) Be able to work productively and collaboratively as a team member by solving problems with other students. (ii) Evaluate the potential impact thermodynamics and kinetics may have in society, health and environment.

Course website

- All course material will be posted to <https://westernu.brightspace.com/>.
- Students are responsible for checking the course OWL Brightspace site (<https://westernu.brightspace.com/>) regularly for news and updates. This is the primary method by which information will be disseminated to all students in the class.
- If students need assistance with the course OWL site, they can seek support on the [OWL Brightspace Help](#) page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

Follow chemistry on Twitter: **@WesternuChem** and join the conversation.

Textbooks & Readings

- Lecture notes, assignments, quizzes, assigned reading, and suggested problems from the textbook posted on <https://westernu.brightspace.com/>.
 - Required Course Textbook for CHEM2274A : Atkins' Physical Chemistry, Volume 1, by Peter Atkins, Julio de Paula, and James Keeler, **12th Edition**, Oxford University Press. Both the hard copy and the electronic version of the book are available in the bookstore: https://bookstore.uwo.ca/textbook-search?campus=UWO&term=W2024A&courses%5B0%5D=001_UW/CHE2374A
 - The solutions' manual of Atkins' Physical Chemistry, Volume 1, has been integrated into the e-book. For students who buy the printed book, there is an access code included that allows for access of the solutions manual on Oxford Learning Link: https://learninglink.oup.com/access/pchem12e_us-student-resources#tag_all-focus
 - Chem2274B 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.
- Optional study sources
- Molecular Driving Forces, 2nd Edition, by Dill/Bromberg (Garland Science, 2010).

Course Evaluation

- Quizzes: 4 X 2.5% = **10%**
- Laboratory experiments: 4 experiment X 4 % = **16%**
- Midterm test 1 (in-class) **17%**
- Midterm test 2 (in-class) **17%**
- Final exam **40%**

- **6 Assignments** : 0% The assignments will not be graded and are not to be submitted for assessment.
 - The assignments provide practice with the new concepts learned in the course. The instructor will provide the answers to the problems of the assignment when the assignment is released.

- The assignment will be released at the beginning of the lectures that are covered; thus, the problems are to be done gradually and be completed as the material progresses.
- The assignments may be solved in collaboration with your peers. Usage of any AI software to provide solutions is NOT RECOMMENDED. It is important to understand the solution – weaknesses in understanding of the solutions will manifest in the quizzes, midterms and final exams.
- For the date of assignment release and the material covered (tentative) please see table that follows.
- **6 Quizzes** out of which the **best 4 Quiz marks** will be counted toward the course grade: 4X2.5 % each = 10% of the course grade.

To receive the bonus of having **the best 4 quiz marks** counted toward the course grade, **the student should write at least 5 quizzes**.

What is the content of the quiz and how is to be done?

- Each quiz may have true/false questions, and/or multiple choice questions or problems, and/or problems to solve explicitly in OWL Brightspace. The questions may or may not be like that of the corresponding assignment, but the examinable material is the same.
- Each quiz corresponds to the material of one assignment.
- The quizzes are to be done individually. Collaborations with others, GPT or AI usage, searching for the answers online, or any other means of obtaining the answer apart from individual effort are not allowed.
- The quiz is open book. During the quiz, you can use your own notes and/or lecture notes and/or textbooks, but not on-line resources as discussed in the previous point. Important note: in preparation of the quiz, it should be taken into consideration that during answering the quiz questions, if the time is spent to search the notes, no time will be left to complete the quiz. Thus, when it is to take the quiz, you should have done your reading and solved the assignment before starting the quiz.
- An equation sheet of all the material in the course will be posted on OWL Brightspace, which you may use if you wish when you solve the quiz, but for the quizzes, you can also create your own equation sheet and notes.
- You should be comfortable with unit conversions.

- The instructor reserves the right to randomize or modify the questions of the quiz delivered to each student.
- The quiz can be submitted multiple times on OWL. Only the grade of the final submission will be recorded, NOT the highest grade of all the attempts.
- At the end of the examination, the answers of each student will be checked for correlations with the other students' responses.

Where?

- The quizzes will be done on-line on OWL and they last for 20 min. The 20 min period will be pre-set on OWL.

When?

- A student may start the quiz any time once the quiz opens. The time of the quiz will terminate at the beginning of the 20th minute from the starting time. For example, if one starts the quiz at 11:05 am the time will end at the beginning of the 25th minute at 11:25 am, NOT WHEN THE 25th minute is completed (this is how OWL manages the time). It is strongly recommended to do the quiz during the work hours so you can be helped by OWL Brightspace support if you have any technical issues. The instructor and TA cannot help with OWL Brightspace technical problems.

Missed quiz?

- There are 6 quizzes in the course. The quizzes are set in certain days to provide self-assessment of the student's progress before midterms and final. It is noted that the quizzes are open for more than one day, thus they have built-in flexibility. If there is a valid reason (e.g. illness, other serious circumstances, varsity competitions) for missing a quiz the instructor may offer accommodation, described in "Accommodation and Accessibility" Section. Please contact the TA to report that you miss the quiz so the information is entered to the gradebook.
- **Mid-terms: 17% each X 2 = 34%** of the course grade.
 - The duration of each midterm is 45 min. and takes place **IN-CLASS**.
 - The dates and the examinable material of the midterms are presented in the table that follows.
 - **Allowed electronic devices during the midterms and final:** Only basic scientific non-programmable 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.

- **Aid-sheet:** In all the exams an aid-sheet will be provided by the instructor. The aid-sheet is posted on OWL Brightspace at the beginning of the course.

Final: 40 % of the course grade.

- The duration of the final exam will be 3 hours and the date will be determined by the registrar's office.
- The exam is cumulative on the entire course material.
- **Allowed electronic devices during the midterms and final:** Only basic scientific non-programmable 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.
- **Aid-sheet:** In all the exams an aid-sheet will be provided by the instructor. The aid-sheet is posted on OWL Brightspace at the beginning of the course.

To pass the course, you must obtain a minimum of 50% in the average of the quizzes, lab reports, midterms and final. **Obtaining a good average grade in the quizzes, midterms & lab reports is not sufficient to pass the course. The final exam MUST be written.**

The quizzes, labs and exams are essential components of the course. The **minimal number of assessments** to pass the course are the following:

- **at least one midterm test;**
- **perform the experiments and provide lab reports for 3 out of the 4 labs;**
- **write the final exam.**

A student who fails to submit the required minimum number of these assessments and is granted academic consideration, will have to apply for a grade of incomplete (INC) at the Dean's Office and submit them the next time the course is offered. Students who submit fewer than the minimum required number of assessments and do not obtain an INC will receive a course grade of not greater than 40%, even if the calculated grade is higher.

Missed labs: A student who misses a lab should apply for academic consideration through the Dean's office. If academic consideration is granted, accommodation is provided as described in "Accommodation and Accessibility" Section.

Midterm tests are essential assessments. At least one of the two midterm tests must be written. A student who misses both midterms, whether excused or not, will have to apply for a grade of incomplete (INC) at the Dean's Office and write the missed tests the next time the course is offered. Students who miss both midterms and do not have an INC will receive a course grade of not greater than 40%, even if the calculated grade is higher.

For accommodation due to illness or other serious reasons see section on ``Accommodation and Accessibility``.

4. Tentative Lecture Schedule

Notes

1. In the schedule that follows, the due dates, the dates of the quizzes, midterms and posting of the assignments are firm. The schedule of lecture material is **TENTATIVE**. The instructor reserves the right to re-arrange the order of the sub-topics if it is necessary for the flow of the course.
2. In the table below the assessments bearing marking are written in red boldface.
3. The assignments are not graded.
4. The quizzes are on the same material as the corresponding (same numbered) assignment.
5. In the table that follows, APK refers to Physical Chemistry, by Peter Atkins, Julio de Paula, and James Keeler, **12th Edition**.

Date	Topics	Associated Readings	Assessment & Due Dates
Friday, September 6	Welcome back! <ul style="list-style-type: none">• Course introduction and strategies to study for the course.• A short anonymous diagnostic assessment	Course syllabus	
	UNIT 1 - FUNDAMENTALS AND EQUATIONS OF STATE		
Monday, September 9	<ul style="list-style-type: none">• What is studied in thermodynamics and where does it apply?• Fundamental definitions (system, type of systems, state variable, state of the system)• Relation of molecular motions to thermodynamics;	APK: Focus 1, pp.4-6	

	Introducing the Boltzmann distribution		
Wednesday, September 11	<ul style="list-style-type: none"> • Temperature & pressure • Conversion of Units • Equation of State • Perfect (ideal) gas law • Mixture of gases 	APK: Focus 1, pp. 6-9	Assignment 1 is released to the students – it covers material from Sept. 11-Sept. 18 inclusive
Friday, September 13	<ul style="list-style-type: none"> • Deviation of the perfect gas from real gases • Compression factor • Relation to intermolecular interactions • Van der Waals equation of state 	APK: Focus 1, pp.18-22	
Monday, September 16	<ul style="list-style-type: none"> • Overview of the 4 experiments that will be done in the course and their relation to the material of the course. 		
Wednesday, September 18	<ul style="list-style-type: none"> • Explanation of the van der Waals isotherms • Law of corresponding states • Significance of the van der Waals equation • Other equations of state 	APK: Focus 1, pp.23-25	Solutions to Assignment 1 are released

	UNIT 2: FIRST LAW AND ENTHALPY		
Friday, September 20	<ul style="list-style-type: none"> • work, different types of work, volume-change work, surface tension work • heat • internal energy • molecular interpretation of internal energy 	APK: Focus 2, pp.33-38	QUIZ 1 – Covers the same material as Assignment 1, i.e. Sept. 9-Sept. 18, inclusive The quiz opens Sept. 20 00:01 am – Monday, Sept. 23, 11:55 pm
Monday, September 23	<ul style="list-style-type: none"> • Heat and work are not state functions • First law of thermodynamics • Reversible vs irreversible processes 	APK: Focus 2, pp.38-43	Assignment 2 is released – it covers material from Sept. 20-Sept. 27, inclusive
Wednesday, September 25	<ul style="list-style-type: none"> • Estimating work, heat internal energy for Isothermal and Isobaric processes • Maximum work 	APK: Focus 2, 38-43	
Friday, September 27	<ul style="list-style-type: none"> • Heat Capacity • Enthalpy • Thermochemistry 	APK: Focus 2, pp. 41-57	Solutions to Assignment 2 are released
Monday, September 30	National Day for Truth and Reconciliation (observed at Western). No classes		

Wednesday, October 2	<ul style="list-style-type: none"> • Adiabatic processes • State function and exact differentials • Partial derivatives • Examples 	APK: Focus 2, pp.58-59, 66-68	QUIZ 2 Covers the same material as Assignment 2, i.e. Sept. 20-Sept. 27, inclusive The quiz opens Oct. 2, 00:01 am to Oct. 4 11:55 pm
UNIT 3: ENTROPY AND THE 2nd LAW; 3rd LAW			
Friday, October 4	<ul style="list-style-type: none"> • Thermodynamic and Statistical Definitions of Entropy • Second Law of thermodynamics 	APK: Focus 3, pp.76-80	Assignment 3 is released. it covers material from Oct. 2- Oct. 11, inclusive
Monday October 7	<ul style="list-style-type: none"> • Estimation of entropy changes • Temperature dependence of entropy changes • Third law 	APK: Focus 3, pp.86-89, 91-95	
Wednesday, October 9			MIDTERM #1 IN-CLASS Duration: 45 min; starts at 12:35 pm, ends at 1:20 pm. Examinable material is

			from Sept. 9 to Sept. 27th, inclusive
	UNIT 4: FREE ENERGY		
Friday, October 11	<ul style="list-style-type: none"> Helmholtz and Gibbs free energy 	APK: Focus 3, pp. 96-99	Makeup for Midterm 1. Time: 1:35pm. Location: TBA.
Oct. 14-Oct. 18	Reading week (includes Thanksgiving)		
Monday, October 21	<ul style="list-style-type: none"> Changes in the Gibbs free energies in chemical reactions Change of Gibbs free energy with temperature and pressure 	APK: Focus 3, pp. 100-102; 107-110	Solutions to Assignment 3 are released
Wednesday, October 23	Phase transitions <ul style="list-style-type: none"> Phase diagrams Clausius-Clapeyron equation	APK: Focus 4, pp. 120-134	QUIZ 3 - Covers the same material as Assignment 3, i.e. Oct. 2- Oct. 11, inclusive The quiz is open Oct. 23, 00:01 am to Oct. 25 11:55 pm

			Assignment 4 released. It covers Oct. 21-Oct. 30, inclusive.
Friday, October 25	Problems solving Clausius-Clapeyron equation		
Monday, October 28	The thermodynamic description of mixtures <ul style="list-style-type: none"> • Partial molar quantities • Chemical potential • Chemical potential of an ideal gas and mixture of ideal gases • Chemical potential of liquids 	APK: Focus 5, pp. 143-151	
Wednesday, October 30	Colligative properties <ul style="list-style-type: none"> • Raoult's law • Lowering of the freezing point and elevation of the boiling point • Osmotic pressure 	APK: Focus 5, pp. 152-162; 162-164	Solutions of Assignment 4 are released.
Friday, November 1	<ul style="list-style-type: none"> • Henry's law Activity and Activity coefficients	APK: Focus 5, pp. 186-190	QUIZ 4 Covers the same material as Assignment 4, i.e. Oct.

			<p>21-Oct. 30, inclusive.</p> <p>The quiz is open Nov 1, 00:01 am to Nov. 4, 11:55 pm</p>
Monday, November 4	<p>Chemical Equilibrium</p> <p>Relation of Equilibrium constant and change in free energy of the reaction</p>	APK: Focus 6, pp. 206-209	Assignment 5 is released. it covers material from Nov 1- Nov. 18, inclusive
Wednesday, November 6	<p>Chemical Equilibrium</p> <ul style="list-style-type: none"> Expressing the equilibrium constant in terms of activities Le Chatelier's principle <p>van't Hoff equation</p>	APK: Focus 6, pp. 209-213, 214-218	
Friday, November 8			<p>MIDTERM #2</p> <p>IN-CLASS</p> <p>Duration: 45 min, starts at 12:35 pm, ends at 1:20 pm</p> <p>Examinable material is from Oct. 2 to Oct. 30, inclusive</p>
Monday, November 11	<p>Electrochemistry</p> <ul style="list-style-type: none"> Electochemical series 	APK: Focus 6, pp. 219-225; 226-230	Makeup for Midterm 2.

	<ul style="list-style-type: none"> Determination of equilibrium constants 		Time: 4:00 pm. Location: TBA.
UNIT 5: CHEMICAL KINETICS			
Wednesday, November 13	<ul style="list-style-type: none"> Experimental methods in chemical kinetics Rate laws and rate constants 	APK: Focus 17, pp. 269-276	
Friday, November 15	<ul style="list-style-type: none"> Integrated rate law Arrhenius equation 	APK: Focus 17, pp. 277-282; 287-291	Solutions of Assignment 5 are released.
Monday, November 18	<ul style="list-style-type: none"> Steady-state approximation The rate-determining step 	APK: Focus 17, pp. 292-296	
Wednesday, November 20	<ul style="list-style-type: none"> Collision theory Transition state theory 	APK: Focus 18, pp. 324-329; 336-340	QUIZ 5 - Covers the same material as Assignment 5, i.e. Nov. 1-Nov. 18, inclusive The quiz is open Nov. 20, 00:01 am to Nov. 22, 11:55 pm

	UNIT 6: TRANSPORT PROCESSES		
Friday, November 22	<ul style="list-style-type: none"> • Diffusion • Fick's 1st law 	APK: Focus 18, pp. 254-257	Assignment 6 is released. It covers material from Nov 20- Nov. 29, inclusive.
Monday, November 25	<ul style="list-style-type: none"> • Fick's 2nd law • Solutions of the diffusion eq. 	APK: Focus 18, pp. 257-260	
Wednesday, November 27	<ul style="list-style-type: none"> • Viscosity 	APK: Focus 18, pp. 244, 247	Solutions to Assignment 6 are released.
Friday, November 29	Material that has not been completed in previous lectures		QUIZ 6 - Covers material from Nov. 22-Nov. 27, inclusive. The quiz is open Nov. 29, 00:01 am to Dec. 3, 11:55 pm
Monday, December 2	Material that has not been completed in previous lectures		
Wednesday, December 4	Review		
Friday, December 6	Review		

Date to be determined by the registrar			FINAL EXAM Duration: 3 hours; cumulative on all the course material
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5. Accommodation and Accessibility

Please visit the Science & Basic Medical Sciences Academic Advising 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/>.

General information about missed coursework

Students must familiarize themselves with the *University Policy on Academic Consideration – Undergraduate Students in First Entry Programs* posted on the Academic Calendar:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf,

This policy does not apply to requests for Academic Consideration submitted for **attempted or completed work**, whether online or in person.

The policy also does not apply to students experiencing longer-term impacts on their academic responsibilities. These students should consult [Accessible Education](#).

For procedures on how to submit Academic Consideration requests, please see the information posted on the Office of the Registrar’s webpage:

https://registrar.uwo.ca/academics/academic_considerations/

All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline.

All Academic Consideration requests must include supporting documentation; however, recognizing that formal documentation may not be available in some extenuating circumstances, the policy allows students to make one Academic Consideration request **without supporting documentation** in this course. However, the following assessments are excluded from this, and therefore **always require formal supporting documentation**:

- Examinations scheduled during official examination periods (Defined by policy)
- Practical laboratory (Defined by policy)
- Midterms

When a student mistakenly submits their one allowed Academic Consideration request **without supporting documentation** for the assessments listed above or those in the **Coursework with Assessment Flexibility** section below, the request cannot be recalled and reapplied. This privilege is forfeited.

Coursework with Assessment Flexibility

Flexible Completion

Quizzes. This course has 6 quizzes, out of which 4 quizzes with the highest marks are counted towards your final grade. If you miss any of the two quizzes, there are no consequences in the grades and no Academic Consideration is needed since only 4 quizzes out of the 6 will count toward the final grade. If the student still wants to write the missed quiz, Academic Consideration may be requested. In this case a make-up quiz may be written only if this is before the solutions of the specific quiz is released to the students.

Should extenuating circumstances arise, students may request Academic Consideration for the third, fourth, fifth, or sixth missed quiz, and the weight of the missed quizzes will be reweighted to the final exam.

Deadline with a No-Late-Penalty Period

Lab reports. Students are expected to submit each of the lab reports by the deadline listed in the lab schedule. Should extenuating circumstances arise, students do not need to request Academic Consideration, and they are permitted to submit their lab report up to 48 hours past the deadline without a late penalty. Should students submit their assessment beyond 48 hours past the deadline, a late penalty of 8% per day will be applied. Academic Consideration requests may be granted only for extenuating circumstances that started before the deadline and lasted longer than the No-Late-Penalty Period (48 hours).

Make-up exams for missed midterm exams

If a student misses a midterm exam, a make-up exam may be provided upon a recommendation from academic counseling, a few days after the scheduling of the regular exam. If the make-up date is still not met because of a valid reason **also approved** by the Academic Counselling Office, then the weight of the missed exam, will be transferred to the final exam.

Missed labs

A student who misses a lab and has received academic consideration will have the weight of the missed lab transferred to the final exam.

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 are able to 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](#)).

Accessible Education

- 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.

- 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.

Religious Accommodation

When conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request an accommodation for their absence in writing to the course instructor and/or the Academic Advising office of their Faculty of Registration. This notice should be made as early as possible but not later than two weeks prior to the writing or the examination (or one week prior to the writing of the test).

Please visit the Diversity Calendars posted on our university's EDID website for the recognized religious holidays:

<https://www.edi.uwo.ca>

6. Academic Policies

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

E-mailing: In accordance with policy, <http://www.uwo.ca/its/identity/activatenonstudent.html>, 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 sent by the University to his/her/their official university address is attended to in a timely manner.

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.

Scholastic offences: Scholastic offences, including plagiarism, 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>).

Computer-marked multiple-choice tests and exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

Code of Conduct: Students are reminded of the University's Code of Conduct found on the university website. To maintain a high standard of learning environment in our classrooms, those who are disruptive, rude, or show unacceptable behavior, either to the instructor, or the other students, will be asked to leave.

7. Support Services

Managing academics and well-being: Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: <https://www.uwo.ca/se/digital/>.

Learning-skills Services: 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.

Emotional/mental distress services: 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.

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

8. Tips for studying for the course

Before the class

- **Prepare.** The lecture notes will be provided in advance. The relevant material of the textbook for all the course is found in this course outline. It is helpful to do a reading of the upcoming lecture notes and/or textbook material before the class.
- **Review.** Review the material of first year chemistry related to ideal gas law, thermodynamics, thermochemistry, equilibrium constant, concentration and how to express concentration using different units and how to convert the units of concentration, electrochemistry. Review the units of the physical quantities and how to convert units.

Inside the class

- **Attend the classes.**
- **Note the tricky points.**
- **Stay focused.** Avoid any distractions such as use of cell phones and laptops. Please keep all these devices turned off and even better do not bring them in the class. **Cell phones and laptops should be turned-off during the class.**
- **Solve the problems in the class.** Every time we do a problem, a few minutes will be given to the students to do the problem themselves before I discuss the solution in the class.
- **Participate** in the class by trying to answer the questions. An incorrect answer can be very useful for building a discussion of the topic around it.
- **Ask questions.**

Progress and Self-assessment

- The expectation is the for every hour of lectures, a student spends two-three hours on self-study.
- Do the assignments. You can collaborate with other students in the assignment preparation.
- Do the assignments gradually throughout the lectures they cover so as you learn the material in a good pace.
- Study for the quizzes and participate in the quizzes. **Do the quizzes yourself** so as you assess yourself that you meet the learning goals.
- Do the solved problems of the textbook by yourself first and then study the solution. Justify every step you do to solve the problem. **Always ask yourself: why am I doing this step in the solution of the problem?**
- Do the suggested problems (list of suggested problems for all the topics of the course is provided at the beginning of the course).

- The lecture notes provide the key ideas, but the textbook discusses more details. Your reading should include both, lecture notes and textbook reading.
- For the students who are interested in learning more on thermodynamics and its applications, current scientific literature is posted in owl for optional reading.
- Use the forum on owl and the office hours. Try to respond to the questions of your peers in the forum.

Resources for reviewing 1st year chemistry and calculus:

Chemistry

- First-year workbook, Department of Chemistry, Western
- [Free Chemistry Textbook Available for Download - OpenStax](#)

Calculus books (free of charge)

- <https://personal.math.ubc.ca/~CLP/CLP1/>
- <https://openstax.org/subjects/math> In openstax.org you may find a number of calculus books including pre-calculus. You may select to use the book that you think is best for your level of knowledge. For example, the following book may be useful for reviewing 1st year University level calculus: [Free Calculus Volume 1 Textbook Available for Download - OpenStax](#)

9. Important Academic Dates (Sept 2024 – December 2024)

- September 5 – Classes begin.
- September 13 - Last day to add a full course or first-term half course or drop a course without showing WDN.
- Sept. 30 - National Day for Truth and Reconciliation (observed at Western). No classes.
- October 12-20 Fall reading week (including Thanksgiving, Oct. 14)
- December 2 - Last day to withdraw from a first-term half course without academic penalty (extended from Sat. Nov. 30).
- December 6 – Fall classes end.
- December 7-8 – Study Days
- December 9-22 December examination period.