



## COURSE OUTLINE

### 1. **Course:** CHEM 471, Physical Chemistry: Kinetics and Spectroscopy - Winter 2022

Lecture 01 : MWF 11:00 - 11:50 in SA 104

Instructor	Email	Phone	Office	Hours
Dr Yujun Shi	shiy@ucalgary.ca	403 210-8674	SB 301	TBA

To account for any necessary transition to remote learning in the winter 2022 semester, courses with in-person lectures, labs, or tutorials may be shifted to remote delivery for a certain period of time. In addition, adjustments may be made to the modality and format of assessments and deadlines, as well as to other course components and/or requirements, so that all coursework tasks are in line with the necessary and evolving health precautions for all involved (students and staff).

#### **In Person Delivery Details:**

All course components will be delivered in-person whenever deemed possible and safe by the University.

- While university health and safety regulations mandate a switch to online or remote learning, CHEM 471 course components will be delivered **synchronously**. Students are expected to be present via Zoom during the scheduled time(s).

**Lectures will start on January 10, 2022.**

**Tutorials will start in the week of January 17, 2022.**

**Laboratories** assessments include three submitted laboratory exercises and one independent project; details and a schedule of activities will be available via D2L.

#### **Re-Entry Protocol for Labs and Classrooms:**

To limit the spread of COVID-19 on campus, the University of Calgary has implemented safety measures to ensure the campus is a safe and welcoming space for students, faculty and staff. The most current safety information for campus can be found [here](#).

#### **Course Site:**

D2L: CHEM 471 L01-(Winter 2022)-Physical Chemistry: Kinetics and Spectroscopy

**Note:** Students must use their U of C account for all course correspondence.

**Office hours:** Office hours will be virtual via the ZOOM platform and students will have to register to the meeting in order to get access to the link. More information will be provided in the first lecture.

#### **Equity Diversity & Inclusion:**

The University of Calgary is committed to creating an equitable, diverse and inclusive campus, and condemns harm and discrimination of any form. We value all persons regardless of their race, gender, ethnicity, age, LGBTQIA2S+ identity and expression, disability, religion, spirituality, and socioeconomic status. The Faculty of Science strives to extend these values in every aspect of our courses, research, and teachings to better promote academic excellence and foster belonging for all.

The Chemistry EDI Committee acknowledges there are persistent barriers that prevent such accessibility and hinder our progress towards EDI. Our representatives (faculty, postdocs, graduate and undergraduate students) are committed to addressing any concerns and work towards proactive solutions that enact necessary change within the department. To submit anonymous questions, comments or concerns regarding EDI related issues, please reach out to our Associate Head EDI, Belinda Heyne ([bjmheyne@ucalgary.ca](mailto:bjmheyne@ucalgary.ca))

### 2. **Requisites:**

See section [3.5.C](#) in the Faculty of Science section of the online Calendar.

**Prerequisite(s):**  
Chemistry 371 and 373.

### 3. Grading:

The University policy on grading and related matters is described in [F.1](#) and [F.2](#) of the online University Calendar.

In determining the overall grade in the course the following weights will be used:

Course Component	Weight	Due Date (duration for exams)	Modality for exams	Location for exams
Quizzes <sup>1</sup>	40%	Ongoing		
Laboratory <sup>2</sup>	25%	Ongoing		
Registrar Scheduled Final Exam	35%	Will be available when the final exam schedule is released by the Registrar	in person	Will be available when the final exam schedule is released by the Registrar

<sup>1</sup> Quizzes will take place **synchronously online** during regularly scheduled class time.

Quiz Dates:

- Quiz #1 on Wednesday, January 26, 2022;
- Quiz #2 on Wednesday, February 16, 2022;
- Quiz #3 on Monday, March 14, 2022; and
- Quiz #4 on Monday, March 28, 2022.

Students will have access to the quizzes at the beginning of the scheduled lecture.

<sup>2</sup> See Lab Schedule in the Lab Manual. The schedule for the 11-week laboratory work can be found on p. 7-8 in the Lab Road Map document. The three lab exercises, weighted 51% of lab marks, are to be completed in the first 5 weeks. The lab work for the Independent Project will be performed in the next 5 weeks and the last week of Chem 471 lab is reserved for the Independent Project presentations. The weight for the Independent Project is 49% of lab marks. The lab marks are worth 25% of the final course grade.

Each piece of work (reports, assignments, quizzes, midterm exam(s) or final examination) submitted by the student will be assigned a grade. The student's grade for each component listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

The conversion between a percentage grade and letter grade is as follows.

	A+	A	A-	B+	B	B-	C+	C	C-	D+	D
Minimum % Required	92 %	87 %	82 %	78%	74%	70 %	66 %	62%	58%	54 %	50 %

This course will have a Registrar Scheduled Final exam that will be delivered in-person and on campus. [The Final Examination Schedule](#) will be published by the Registrar's Office approximately one month after the start of the term. The final exam for this course will be designed to be completed within 2 hours.

In order to satisfy the prerequisite requirements (i.e., C-) for further Chemistry courses, a student must meet the following requirements: (1) achieving a passing grade (i.e., a minimum 50%) in the laboratory grading component. AND (2) achieve a passing grade (i.e., a minimum 50%) for the non-laboratory components (the weighted average of the quizzes and final examination). This means that if a student scores below 50% in either the laboratory component or weighted average of the non-laboratory component, the maximum course letter grade they can obtain in CHEM 471 is a D+.

The University of Calgary offers a [flexible grade option](#), Credit Granted (CG) to support student's breadth of learning and student wellness. Faculty units may have additional requirements or restrictions for the use of the CG grade at the faculty, degree or program level. To see the full list of Faculty of Science courses where CG is not eligible, please visit the following website: <https://science.ucalgary.ca/current-students/undergraduate/program-advising/flexible-grading-option-cg-grade>

### 4. Missed Components Of Term Work:

The university has suspended the requirement for students to provide evidence for absences. Please do not attend medical clinics for medical notes or Commissioners for Oaths for statutory declarations.

In the event that a student legitimately fails to submit any online assessment on time (e.g. due to illness etc...), please contact the course coordinator, or the course instructor if this course does not have a coordinator to arrange for a re-adjustment of a submission date. Absences not reported within 48 hours will not be accommodated. If an excused absence is approved, one possible arrangement is that the percentage weight of

the legitimately missed assignment could also be pro-rated among the components of the course. This option is at the discretion of the coordinator and may not be a viable option based on the design of this course.

## 5. **Scheduled Out-of-Class Activities:**

There are no scheduled out of class activities for this course.

## 6. **Course Materials:**

Recommended Textbook(s):

Thomas Engel and Philip Reid, *Thermodynamics, Statistical Thermodynamics, and Kinetics, 4th Edition* Pearson.

Thoma Engel, *Quantum Chemistry and Spectroscopy, 4th Edition*. Pearson.

In order to successfully engage in their learning experiences at the University of Calgary, students taking online, remote and blended courses are required to have reliable access to the following technology:

- A computer with a supported operating system, as well as the latest security, and malware updates;
- A current and updated web browser;
- Webcam/Camera (built-in or external);
- Microphone and speaker (built-in or external), or headset with microphone;
- Current antivirus and/or firewall software enabled;
- Stable internet connection.

For more information please refer to the UofC [ELearning](#) online website.

## 7. **Examination Policy:**

The final examination will be scheduled by the Registrar. The final examination is designed to be completed in 2 hours of writing time. *Note: If the final exam were to be rescheduled online due to university policy, it would be synchronous and have an additional +50% time added as a buffer against technical issues.*

### **Allowed resources**

- **All quizzes and exams** (regardless of format) are to be completed **individually** by the student, with no communication with other persons.
- Any **in-person** exam will be closed-book, and no resources or references are allowed during the assessment.
- All quizzes are **online** and open-book. Reference to your course notes, your own formula sheet, or your own textbook (electronic or paper edition) are allowed. It is suggested that you create your own formula sheet that included important formulae and constant values. No other aids are allowed on quizzes, including accessing internet resources such as search engines (Google, etc.), other websites, shared documents (Google docs, etc.) or chat servers (Discord, WhatsApp, etc.), and you are specifically prohibited from working or contacting any other individuals while you complete the quizzes and/or the final examination. It is important to note that the time required for browsing your own course notes or textbook is not taken into consideration when evaluating the time it requires to complete the quizzes. This is why it is strongly advised that you create your own formula sheet for an easy access to formulae and constant values.

### **Online assessment timing**

There will be four **synchronous, online** in-class quizzes during the scheduled lecture time (dates listed in Section 3). *Students may write the quiz from a location of their choosing and are not required to be physically present in the lecture room on a quiz date (even once lectures return to in-person delivery).*

- Each quiz is designed to be written in 30-minutes, but students will be provided with an additional 15-minutes of **buffer time** to account for unexpected technical issues that may arise.
- For each **online synchronous assessment**, time will be adjusted for SAS students if needed. As well, accommodations for students facing a significant barrier to writing the assessment during the scheduled time will be done on a case-by-case basis, e.g., caregiving responsibilities, ability to secure an appropriate test-taking environment. Information on specific dates is provided in Section 3 (Grading). Students who need accommodation for one or all of the quizzes must contact Dr. Shi before January 17, 2022 at 11:59 pm. Should circumstances change for a student since the start of the term, the student must contact Dr. Shi *at least one week before* the specific quiz date.

Students should also read the Calendar, [Section G](#), on Examinations.

## 8. **Approved Mandatory And Optional Course Supplemental Fees:**

The Department of Chemistry has a laboratory glassware breakage fee. At the start of the course, each student is assigned a locker and checks-in to establish that they have a complete set of usable glassware. By signing for check-in, a student agrees that they are now responsible for the glassware until check out. Any equipment that is missing, unusable or has been replaced during the semester will be charged to the student. All students, even those who withdraw early from the course must check out of the laboratory before the last day of lectures. Any student who fails to check out before the last day of lectures for the term will be assessed a charge of \$30.00. If this fee is not paid by the posted deadline, university services (registration, transcripts, etc.) may be withheld.

## 9. **Writing Across The Curriculum Statement:**

For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation etc.) can be a factor in the evaluation of the work. See also Section [E.2](#) of the University Calendar.

## 10. **Human Studies Statement:**

Students will not participate as subjects or researchers in human studies.

See also [Section E.5](#) of the University Calendar.

## 11. **Reappraisal Of Grades:**

A student wishing a reappraisal, should first attempt to review the graded work with the Course coordinator/instructor or department offering the course. Students with sufficient academic grounds may request a reappraisal. **Non-academic grounds are not relevant for grade reappraisals.** Students should be aware that the grade being reappraised may be raised, lowered or remain the same. See [Section I.3](#) of the University Calendar.

- a. **Term Work:** The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within **ten business days** of either being notified about the mark, or of the item's return to the class. If the student is not satisfied with the outcome, the student shall submit the Reappraisal of Graded Term work form to the department in which the course is offered within 2 business days of receiving the decision from the instructor. The Department will arrange for a reappraisal of the work within the next ten business days. The reappraisal will only be considered if the student provides a detailed rationale that outlines where and for what reason an error is suspected. See sections [I.1](#) and [I.2](#) of the University Calendar
- b. **Final Exam:** The student shall submit the request to Enrolment Services. See [Section I.3](#) of the University Calendar.

## 12. **Other Important Information For Students:**

- a. **Mental Health** The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, [Mental Health Services Website](#)) and the Campus Mental Health Strategy website ([Mental Health](#)).
- b. **SU Wellness Services:** For more information, see [www.ucalgary.ca/wellnesscentre](http://www.ucalgary.ca/wellnesscentre) or call [403-210-9355](tel:403-210-9355).
- c. **Sexual Violence:** The Sexual Violence Support Advocate, Carla Bertsch, can provide confidential support and information regarding sexual violence to all members of the university community. Carla can be reached by email ([svsa@ucalgary.ca](mailto:svsa@ucalgary.ca)) or phone at [403-220-2208](tel:403-220-2208). The complete University of Calgary policy on sexual violence can be viewed at (<https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Sexual-and-Gender-Based-Violence-Policy.pdf>)
- d. **Misconduct:** Academic integrity is the foundation of the development and acquisition of knowledge and is based on values of honesty, trust, responsibility, and respect. We expect members of our community to act with integrity. Research integrity, ethics, and principles of conduct are key to academic integrity. Members of our campus community are required to abide by our institutional [Code of Conduct](#) and promote academic integrity in upholding the University of Calgary's reputation of excellence. Some examples of academic misconduct include but are not limited to: posting course material to online platforms or file sharing without the course instructor's consent; submitting or presenting work as if it were the student's own work; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; borrowing experimental values from others without the instructor's approval; falsification/fabrication of experimental values in a report. Please read the following to inform yourself more on academic integrity:

[Student Handbook on Academic Integrity](#)  
Student Academic Misconduct [Policy](#) and [Procedure](#)  
[Research Integrity Policy](#)

Additional information is available on the [Student Success Centre Academic Integrity page](#)

e. **Academic Accommodation Policy:**

It is the student's responsibility to request academic accommodations according to the University policies and procedures listed below. The student accommodation policy can be found at: <https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Student-Accommodation-Policy.pdf>

Students needing an accommodation because of a disability or medical condition should communicate this need to Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities: <https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Accommodation-for-Students-with-Disabilities-Procedure.pdf>.

Students needing an accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, by filling out the [Request for Academic Accommodation Form](#) and sending it to Dr. Yuen-Ying Carpenter by email [yyscarpe@ucalgary.ca](mailto:yyscarpe@ucalgary.ca) preferably 10 business days before the due date of an assessment or scheduled absence.

f. **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). Students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information, see [Legal Services](#) website.

g. **Student Union Information:** [VP Academic](#), Phone: [403-220-3911](tel:403-220-3911) Email: [suvpaca@ucalgary.ca](mailto:suvpaca@ucalgary.ca). SU Faculty Rep., Phone: [403-220-3913](tel:403-220-3913) Email: [sciencerep@su.ucalgary.ca](mailto:sciencerep@su.ucalgary.ca). [Student Ombudsman](#), Email: [ombuds@ucalgary.ca](mailto:ombuds@ucalgary.ca).

h. **Surveys:** At the University of Calgary, feedback through the Universal Student Ratings of Instruction ([USRI](#)) survey and the Faculty of Science Teaching Feedback form provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses. Your responses make a difference - please participate in these surveys.

i. **Copyright of Course Materials:** All course materials (including those posted on the course D2L site, a course website, or used in any teaching activity such as (but not limited to) examinations, quizzes, assignments, laboratory manuals, lecture slides or lecture materials and other course notes) are protected by law. These materials are for the sole use of students registered in this course and must not be redistributed. Sharing these materials with anyone else would be a breach of the terms and conditions governing student access to D2L, as well as a violation of the copyright in these materials, and may be pursued as a case of student academic or [non-academic misconduct](#), in addition to any other remedies available at law.

### 13. Laboratory exemptions

Students repeating the course within the last two years can be exempted from the Laboratory Component of the course if a grade of 75% or higher was obtained on the lab portion. Students choosing to exempt from the lab should be aware that,

- the material covered in these in-person labs will be integrated into other course assessments; and,
- the lab grade achieved on the previous attempt will be carried forward.

Prior to applying for an exemption, students are encouraged to connect with their course instructor or coordinator to better understand the risks and benefits in their specific online course, as well as what access they will (or will not) have to lab materials or feedback as an exempt student.

Students applying for a lab exemption should contact the Undergraduate Science Center ([science.advising@ucalgary.ca](mailto:science.advising@ucalgary.ca)) **no later than the week of the drop deadline** to apply. Students registering in the course after this date should contact the USC as soon as possible if they wish to apply for an exemption.

### 14. Laboratory Safety Course

All undergraduate students taking chemistry laboratories are required to complete an introductory course (approx. 50 minutes) on laboratory safety. This course is presented in an online format and must be completed

prior to the first in-person laboratory. Students who have previously completed the Chemistry Safety Course at the University of Calgary in the past five years are NOT required to repeat it.

**Course Outcomes:**

- Determine the rates of chemical reactions and relate the laws describing those rates to the mechanisms of reactions; explain the transition state theory and apply it to predict the reaction rates.
- Demonstrate an understanding of rotational, vibrational, and electronic spectroscopy and nuclear magnetic resonance; apply this knowledge to explain the underlying principles of different spectroscopic techniques.
- Have the capacity to engage in an independent research project.
- Critically assess and analyze interim kinetics and spectroscopic experimental results and adjust the experimental plan if necessary; design and conduct control experiments to support experimental findings.
- become expert users of the spectroscopic equipment in the Physical Chemistry laboratory; strengthen lab skillsB
- Participate actively in a group at all stages of working on the research project; communicate research ideas and findings effectively both in written and oral format.

Electronically Approved - Jan 31 2022 13:48

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**Department Approval**

Electronically Approved - Jan 31 2022 15:01

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**Associate Dean's Approval**