



## COURSE OUTLINE

### 1. **Course:** CHEM 371, Physical Chemistry: Thermodynamics Chemistry - Winter 2021

Lecture 01: MWF 12:00 - 12:50 - Online

Instructor	Email	Phone	Office	Hours
Dr. Peter Kusalik	pkusalik@ucalgary.ca (email preferred)		SB 331	by appointment

**First class meeting, Jan. 11, will be on Zoom at the scheduled class time.** Details will be provided on D2L

Start date of labs: week of Jan. 18 (further details will be provided during first class and on D2L)

Start date of tutorials: Jan. 15 for T02 and T03, Jan. 18 for T01 (further details will be provided during first class and on D2L)

#### **Online Delivery Details:**

Some aspects of this course are being offered in real-time via scheduled meeting times. For those aspects you are required to be online at the same time.

To help ensure Zoom sessions are private, do not share the Zoom link or password with others, or on any social media platforms. Zoom links and passwords are only intended for students registered in the course. Zoom recordings and materials presented in Zoom, including any teaching materials, must not be shared, distributed or published without the instructor's permission.

This course has a registrar scheduled, synchronous final exam. The writing time is 2 hours + 50% buffer time.

#### **Lectures: Hybrid**

Recorded videos of lectures (3 per week) will be prepared and posted on D2L. Students will have a viewing assignment (posted on D2L) of typically 3 lectures each week. Summary lecture notes will be provided on D2L which students should annotate while viewing the lecture videos. Note that the first class meeting on Jan. 11 will be on Zoom (see details above) and this class meeting will be recorded. Further details will be provided on D2L.

During regular class time on Monday and Wednesday each week (unless otherwise explicitly indicated on D2L), open Q&A sessions will be hosted on Zoom (see D2L for details). These sessions are expected to focus primarily on the lecture assignments for that week, and students are encouraged to submit their questions in advance (via email, D2L Topic Discussion board, or Top Hat anonymous forum). Attendance is not required and the Q&A sessions will not be recorded (so students do not feel intimidated about asking questions). Further details about these Q&A sessions will be provided during the first class meeting and on D2L.

During regular class time on Friday each week (unless otherwise explicitly indicated on D2L) there will be a quiz consisting of several short questions and focused primarily on the most recent lecture viewing assignment. These lecture quizzes will be hosted on Top Hat, where each question will incorporate 33 to 50% buffer time (depending on the complexity of the question) and question scoring will include a participation component. Accommodations for missed quizzes will be made on a case-by-case basis (see below and section 4). Further details about these quizzes and accessing Top Hat will be provided during the first class meeting and on D2L.

#### **Labs: Synchronous**

All labs will be delivered synchronously. Student are required to attend their scheduled lab section. Accommodations for missed labs will be made on a case-by-case basis (see below and section 4). Additionally, prior to their scheduled lab students will need to read the appropriate section of the lab manual, as well as will usually need to view a lab video and complete a pre-lab quiz. Further details about labs will be provided during the first class meeting, on D2L, and in the lab manual (posted on D2L).

#### **Tutorials: Synchronous**

All tutorials will be delivered synchronously. Student are required to attend their scheduled tutorial section. Accommodations for missed tutorials will be made on a case-by-case basis (see below and section 4). Tutorial will generally operate on a biweekly cycle, where during the first week the tutorial meeting will occur on Zoom with students working in small groups to solve assigned exercise problems, and during the second week students will write a tutorial quiz (on D2L within the scheduled time with 50% buffer time being provided). Further details about tutorials will be provided during the first class meeting and on D2L.

#### **D2L and D2L Calendar:**

D2L will be a primary information source for the course. A course calendar will be maintained on D2L and all

required activities will be announced there, with any changes posted with at least 1-week notice.

**Course Site:**

D2L: CHEM 371 L01-(Winter 2021)-Physical Chemistry: Thermodynamics

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

2. **Requisites:**

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

**Prerequisite(s):**

Chemistry 201 or 211; and 203 or 213; Physics 223 or admission to a Major program offered by the Department of Physics and Astronomy and 6 units of Physics; and Mathematics 267 or 277.

**Antirequisite(s):**

Credit for Chemistry 371 and any of Physics 347, 349, or 447 will not be allowed.

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:

Component(s)	Weighting %	Date
Lecture quizzes (weekly)	10%	
Tutorials (5 exercise & quiz cycles, 4% each)	20%	
Laboratory (8 experiments/labs)	30%	
Midterm exam (out of class; 100 min.)	15%	6:30 pm - 9:00pm, Mar. 10 (see Section 5)
Final Examination (2 hr)	25%	registrar scheduled

\*All assessments are timed and synchronous, except for the laboratory, where laboratory reports will be submitted after the synchronous lab period (see the lab manual for details).

**Accommodations for synchronous course components**

Students not able to complete or attend any synchronous class component or assessment (including labs, quizzes, or exams) during the scheduled time for legitimate reasons (e.g. due to issues such as different time zone, caregiving responsibilities, ability to secure an appropriate test-taking environment) and needing alternative arrangements should contact the instructor with this request. Possible arrangements can include alternate timing, a different assessment, or a waiving of this component (with then an appropriate reweighting of the appropriate remaining course components). Requests of such arrangements for examinations must be made no later than **14 days** prior to the date of the examination. Requests of such arrangements for all other class components or assessments must be made no later than 7 days prior to the date of the activity.

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
<b>Minimum % Required</b>	92 %	87 %	82 %	77%	72%	67 %	62 %	58%	54%	50 %	46 %

This course will have a final exam that will be scheduled by the Registrar. [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.

The final exam will be administered using an on-line platform. Per section [G.5](#) of the online Academic Calendar, timed final exams administered using an on-line platform, such as D2L, will be available on the platform. **Due to the scheduling of the final exams, the additional time will be added to the end of the registrar scheduled synchronous exam to support students. This way, your exam schedule accurately reflects the start time of the exam for any synchronous exams. E.g. If a synchronous exam is designed for 2 hours and the final exam is scheduled from 9-11am in your student centre, the additional time will be added to the end time of the**

**synchronous exam.** This means that if the exam has a 1 hour buffer time, a synchronous exam would start at 9 am and finish at 12pm. - updated April 6, 2021

**Notes:**

Students will be expected at every stage to understand the material covered in all components of the course.

In order to obtain a grade of C- or higher (necessary to satisfy the prerequisite requirements for further Chemistry courses), a student must meet the following requirements: (1) achieve a minimum 50% in the laboratory, and (2) achieve a minimum 50% weighted average on the Midterm and Final examinations and tutorial quizzes. If conditions (1) and (2) are not both satisfied, then the maximum course letter grade a student can obtain in CHEM 371 is a D+.

**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, then the percentage weight of the legitimately missed assignment could also be pro-rated among the components of the course.

Any absences **must** be reported **within 48 hrs**.

If a student has missed a lab for legitimate reasons and the absence is approved, the student may be allowed to complete the lab at another time, or if this can not be arranged the weights of the remaining experiments/labs may be adjusted. If it is determined that a student missed a scheduled lab for non-legitimate reasons (e.g. vacation, sleeping in, not prepared), the contribution of that experiment in the final course grade will be zero.

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

The following out of class activities are scheduled for this course.

Activity	Location	Date and Time	Duration
Midterm Exam	WEB-BASED	Wednesday, March 10, 2021 at 6:30 pm	2.5 Hours

**REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME-ACTIVITY.** If you have a conflict with the out-of-class-time-activity, please contact your course coordinator/instructor no later than **14 days prior** to the date of the out-of-class activity so that alternative arrangements may be made.

**6. Course Materials:**

Required Textbook(s):

Thomas Engel and Philip Reid, *Physical Chemistry, 4th Edition*: Pearson.

Required: Chemistry 371 Laboratory Manual (available online from the course website on D2L)

Required: Excel computer software for analysis of lab data (available free to University of Calgary students)

During exams and quizzes, students must be able to generate a scan or photo of their written solutions to upload to D2L.

Students must arrange access to Top Hat for lecture quizzes. Top Hat is free for University of Calgary students. Further details will be provided on the first day of class and on D2L.

**Suggested practice resources:**

*Mastering Chemistry* - available through the textbook publisher website. Provides additional practice on course related material. Further details will be provided on the first day of class and on D2L.

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:

During all examinations and quizzes, students can consult or use their textbook and their notes, as well as any course material that has been posted on D2L. Students **must** work **individually**, and are not allowed to consult or communicate with any other individuals, and are not allowed to consult or access any other online source or website. If in doubt, check with your instructor prior to the exam or quiz.

Students requiring accommodation for a disability or medical condition must be registered with Student Accessibility Services (see Section 12(e) below) and must identify themselves to their instructor as soon as possible, and no later than 14 days before any assessment for which they are seeking accommodation.

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

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

**Laboratory breakage fees and check-out:** Due to online learning, laboratory checkout is not required this semester. No fees will be assessed for either breakage or failure-to-checkout.

## 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.

In this course, the quality of the student's writing in laboratory reports and in written responses for appropriate quiz and exam questions will be a factor in their evaluation.

## 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.

- 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
- 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:

- 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/policies/files/policies/sexual-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:** Students needing an accommodation because of a disability or medical condition should contact Student Accessibility Services in accordance with the procedure for accommodations for students with disabilities available at [procedure-for-accommodations-for-students-with-disabilities.pdf](#).

Students needing an accommodation in relation to their coursework or to fulfill requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Associate Head of the Department of Chemistry, Dr. Yuen-Ying Carpenter by email [ahugchem@ucalgary.ca](mailto:ahugchem@ucalgary.ca) or phone 403-220-6908. Religious accommodation requests relating to class, test or exam scheduling or absences must be submitted no later than **14 days** prior to the date in question. See [Section E.4](#) of the University Calendar.

- f. **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIP). 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 and Tutorial Information

*Laboratory activities will begin the week of Jan. 18, 2021* It is mandatory that students attend their scheduled lab section (on Zoom). During these Zoom sessions, students are strongly encouraged to turn on their cameras.

The lab manual can be found on the course D2L site. You must read this laboratory manual prior to attending any of your scheduled lab periods and have the appropriate portion available for consultation during your laboratory. Additionally, there will usually be a lab video to watch and a pre-lab quiz to complete prior to each lab.

*Lab 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 new online labs in Winter 2021 may be significantly different from prior labs in this course;
- the material covered in these online 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 Monday January 18th, 2020** 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.

*Tutorials.* Students will write 5 quizzes in tutorials during the term. Marks will also be assigned for participation (*which includes any meaningful activities directly related to the CHEM 371 tutorial exercises*) in tutorials; details will be provided on the first day of class. The first week of each tutorial cycle (during which students will work on exercise problems) will be hosted on Zoom, during which students are strongly encouraged to turn on their cameras.

#### **Course Outcomes:**

- Demonstrate an understanding of the principles and laws of thermodynamics and their applications to chemical and physical systems and their equilibria.
- Describe phase behaviour and changes of state for both pure and mixed systems, relate these to appropriate phase diagrams, and distinguish between real and ideal behaviour.
- Explain the roles of free energy and chemical potential in chemical reactions and physical changes.
- Strengthen problem-solving skills, particularly when applying the principles and concepts of physical chemistry to appropriate systems and conditions; analyze problems and work independently.
- Set up and perform physical chemical experiments, using standard instrumentation and employing all appropriate experimental and safety best practices; collect data through a computer interface (LabView).
- Analyze and interpret experimental data, evaluate and identify trends and anomalies, identify appropriate literature sources and assess reliability of values, and generate appropriate conclusions from an experiment.
- Strengthen team-work and scientific communication skills, including the ability to communicate clearly and effectively with people, and respecting both yourself and others.

Electronically Approved - Apr 06 2021 16:04

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#### **Department Approval**

Electronically Approved - Apr 06 2021 16:29

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#### **Associate Dean's Approval**