Course Info

Course Instructor (Section M)

Prof. Sylvie Morin
smorin@yorku.ca
PSE 346
Office Hours: T: 11:30-12:30
W: 12:00-13:00
or by appointment

Zoom Class Link:
https://yorku.zoom.us/j/91423254075

Course Instructor (Section N)

Prof. Tihana Mirkovic
tihanam@yorku.ca
CB 358
Office Hours: T: 10:00-11:00
F: 10:00-11:00
or by appointment

Zoom Class Link:
https://yorku.zoom.us/j/96973641051

Class Meetings

Sections M

Tuesday **(CLH A)** and
Thursday **(CLH G)**
13:00 – 14:20

Sections N

Tuesday **(CLH B)** and
Thursday **(CLH E)**
11:30 – 12:50

Tutorial Meetings

Sections M (DB 0001)
Thursday
13:30 – 14:20

Sections N (CLH B)
Thursday
13:30 – 14:20

CHEM 2011

Introduction to Thermodynamics

Course

The central theme of this course is that, through application of basic physical chemistry principles, one can rationalize phenomena both on the microscopic and macroscopic scales – from the behaviour of a single molecules, to multifaceted processes in biology, to the optimization of reaction conditions of industrial processes.

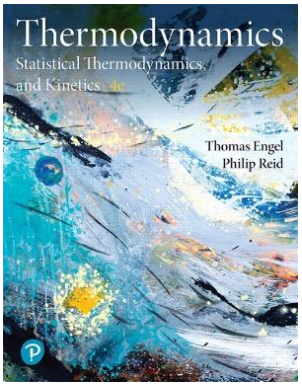
CHEM 2011 will introduce key concepts in modern physical chemistry focusing on thermodynamics and selected topics in kinetics. It serves as an introductory course for physical chemistry and will prepare you for 3000-level chemistry and bio-stream sciences.

Prerequisites: SC/MATH 1014 3.00, or SC/MATH 1505 6.00 with a minimum grade of B; SC/CHEM 1001 3.00 or SC/CHEM 1100 4.00.

Course Credit Exclusions: None

Textbook

Physical Chemistry: Thermodynamics, Statistical Thermodynamics, and Kinetics, 4th Edition, by Thomas Engel and Philip Reid, 2019, Pearson



This is a required textbook, and all of the references (page numbers, problem numbers, etc.) will be based on this edition. The textbook is available at the York Bookstore (ISBN-13: 9780134813455 see left).

The 3rd edition (2013) ISBN-13: 978-0-321-824004) may be used, however it will be **your responsibility** to match the material in the 4th edition to the material in the 3rd edition.

You will be instructed in class on how to obtain the solutions manual if you have purchased the textbook with the Mastering package.

Course Website

The course will be managed through the York eClass website:
https://eclass.yorku.ca/
Make sure you are subscribed with the correct e-mail address as many important course announcements will be posted on eClass in the course of the semester. The course website will serve as a primary source for much of the information upon which you need to remain up-to-date. The course lecture notes, tutorial assignments, test information and other course material will be posted frequently on the website as the course progresses. Visit the course website on a regular basis!

Land Acknowledgement

York University recognizes that many Indigenous Nations have longstanding relationships with the territories upon which York University campuses are located that precede the establishment of York University. York University acknowledges its presence on the traditional territory of many Indigenous Nations. The area known as Tkaronto has been care taken by the Anishinabek Nation, the Haudenosaunee Confederacy, and the Huron-Wendat. It is now home to many First Nation, Inuit, and Métis communities. We acknowledge the current treaty holders, the Mississaugas of the Credit First Nation. This territory is subject of the Dish with One Spoon Wampum Belt Covenant, an agreement to peaceably share and care for the Great Lakes region.

Lectures

You should make every effort to attend the live lectures, since the fundamental content of the course is going to be discussed there. Outlines of the lectures will be posted on-line, but details and example questions will be only provided during the lectures.
You are responsible for material taught in lectures. If you do not understand something, do get clarification right away. Note that, due to the large size of the class, it is not possible to answer questions by e-mail. However, you are encouraged to ask questions during lectures, office hours or during tutorials.

Tutorials

You must be able to apply concepts taught in lectures to solve problems.
Note that tutorials will provide very useful examples of problems that you should be able to solve on tests and on the exam, and provide an excellent opportunity to ask questions. Tutorials will be used to take up assigned problems that students do not have solutions for.

Test and Exam Schedule

Two tests will be held on Monday evenings to allow both sections to write at the same time. Any changes to the schedule will be announced to the class. A cumulative exam will be given at the end of the semester (date to be determined). One week prior to the test/exam students will be informed what course material is testable and what the logistics of the particular test/exam will be.

Schedule		
Test 1 (90 min)	*February 26, 2024*	*(18:00-19:30)*
Test 2 (90 min)	*March 25, 2024*	*(18:00-19:30)*
Final Exam (3 hrs)	*TBD (April 10-26, 2024)*	

Quiz Schedule

Four **30-min** quizzes will be given during the term in the scheduled tutorial session.

Schedule	
Quiz 1	*January 24, 2004*
Quiz 2	*February 7, 2004*
Quiz 3	*March 6, 2004*
Quiz 4	*April 3, 2004*

Grading Scheme

Component	Percentage	Alternative Grading scheme 1	Alternative Grading scheme 2
Test 1 (90 min)	20%	26.67%	*Completed (with efforts demonstrated)*
Test 2 (90 min)	20%	26.67%	*Completed (with efforts demonstrated)*
4 Tutorial quizzes (5% each)	20 %	26.67%	*Completed*
Final exam	40%	20%	100%

*Alternative Grading Scheme: **If students write both their tests and all their quizzes,** they will be eligible to have their final grade be calculated using either of the alternative grading schemes. The higher of the three grades will be reported as the final grade.

***IMPORTANT**: Note that modifications to the grading scheme could occur if COVID-induced changes are necessary. Any modifications to the grading scheme would apply to all students.

Key Learning Outcomes

For detailed learning outcomes based on each chapter, please see document posted on eClass.

LOC 1 *Identify the variables, unknowns, conditions and constraints in chemical and physical problems.*

LOC 2 *Formulate a strategy for solving quantitative problems in chemistry based on known/provided relationships.*

LOC 3 *Identify relationships and trends between physical/chemical parameters from graphical representations.*

LOC 4 *Develop proficiency in understanding theories that characterize thermodynamic quantities (heat, work, internal energy, enthalpy, entropy, Gibbs free energy) and use them to predict/calculate their value/change when applied to natural events.*

LOC 5 *Perform appropriate calculations, including the use of integration and differentiation, to evaluate thermodynamic and kinetic values.*

Course Content

Thermodynamics

Approx. Number of Lectures (18)

Chapter 1 **Fundamental Concepts in Thermodynamics**

Basic definitions, system/surroundings, thermometry, ideal gas las, intro to real gases.

Chapter 2 **Heat, Work, Internal Energy, Enthalpy, and the First Law of Thermodynamics**

Definitions of heat and work, Calculations of thermodynamic properties for reversible /irreversible, isothermal/adiabatic processes, Heat Capacity, Enthalpy

Chapter 3 **The Importance of State Functions: Internal Energy and Enthalpy**

Mathematical properties of state functions, Dependent of U on V and T, Variation of enthalpy on P and T, Relation between C_p and C_v.

Chapter 4 **Thermochemistry**

Enthalpy change associated with chemical reactions, Hess's Law, Temperature dependence of reaction enthalpies, Calorimetry

Chapter 5 **Entropy and the Second and Third Laws of Thermodynamics**

Statistical and Thermodynamic Definition of Entropy, Carnot Heat Engine, Second and Third Laws of Thermodynamics, Calculation of Entropy Changes

Chapter 6 **Chemical Equilibrium**

Differential forms of U, H, A and G, Chemical equilibrium in gaseous systems; Heterogeneous equilibria; Influence of temperature on equilibrium constant; Real gases; Reactions in solution

Kinetics

Approx. Number of Lectures (4)

Chapters 18/19 **Topics from: Elementary Chemical Kinetics and Complex Reaction Mechanisms**

Reaction rate; Reaction order; Molecularity of reaction; Reversible reactions; Consecutive reactions; Parallel reactions; Effect of temperature on reaction rate; Oscillating reactions

COURSE POLICIES

1. E-MAIL ETIQUETTE

Use your Yorku email address as other email addresses (e.g., Hotmail) are filtered out by the university's email system and do not always reach their intended recipient. Please do not use the eClass email function or respond to course announcement emails.

Subject line, CHEM 2011, your name, student number and a brief indication of topic (e.g., 'Question regarding gene regulation). We receive a lot of email and this practice helps us sort emails efficiently. Emails without the required information will not receive a response.

Please include your NAME at the end of each email.

Due to the size of the class, we will not be able to offer individual tutoring by e-mail. If you need help, please consider attending office hours.

2. MISSED TESTS/FINAL

No makeup tests will be offered. An exception might be made for students with potential class/test overlap with other courses – they will be provided with instructions on how to follow up with their instructor closer to the test date. If you must miss the test, you **DO NOT** need to provide any documentation for your absence. The weight of the missed test/quiz will be automatically transferred to your final exam. Please be advised that you should carefully think about using this option and how this may affect your final grade as the material in this class is cumulative. Making the final exam very heavily weighted will put a lot of pressure on you during the scheduled exam period in April.

ALL students who miss the **FINAL EXAM MUST** submit a deferred standing agreement (DSA) within 5 business days of the missed exam. The submission will be done on eClass. The DSA must be accompanied by the documentation supporting the absence. If your DSA is approved, you will be given an opportunity to write the deferred final exam. If your DSA is denied, you will need to petition the course to your home Faculty. **Note**, that one element of approval of DSA forms will be the evaluation of the student's participation in term assessments – if it is found that the student has not participated in the course during the term, the DSA form is likely to be denied.

3. RE-MARKING REQUESTS

If you believe a written answer on a test was marked incorrectly you must submit a written rationale detailing the suspected error through eClass (instructions to be given at a later date) within 1 week of receiving your marked paper. We will aim to address all re-marking requests within 1-2 weeks of receiving them. NOTE: re-marking can result in the mark being raised, confirmed, or lowered. To be fair and consistent with regards to the entire class, individual grades are NOT negotiable. We cannot provide 'extra credit' assignments. Marks for quizzes and tests are not 'rounded' or 'bell-curved'.

4. ACCOMMODATIONS

Please email me a pdf, a scan, or a photo of your CDS Accommodation letters as soon as possible. Please also notify me of any religious observance conflicts occurring at any point during the term, for which accommodations will be required by the date stated in the senate policy on religious observance accommodation.

Please note: "Senate policy states that students are expected to monitor their progress in courses, taking into account their personal and academic circumstances, and to make the necessary adjustments to their workload to meet the requirements and deadlines." (from Senate Policy of Students' Responsibilities in the Petition/Appeal Processes).

Students with physical, learning, or psychiatric disabilities who require reasonable accommodations in resources or evaluation methods are encouraged to consult with the Office for Persons with Disabilities (OPD) and ensure that requests for appropriate accommodations are arranged with the Section Instructor early in the term.

5. ACADEMIC INTEGRITY

Students should be familiar with, and follow York University's policies regarding academic integrity. See: https://spark.library.yorku.ca/academic-integrity-what-is-academic-integrity/

UNIVERSITY POLICIES

1. ACADEMIC HONESTY AND INTEGRITY

York students are required to maintain the highest standards of academic honesty and they are subject to the Senate Policy on Academic Honesty (http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/). The Policy affirms the responsibility of faculty members to foster acceptable standards of academic conduct and of the student to abide by such standards.

There is also an academic integrity website with comprehensive information about academic honesty and how to find resources at York to help improve students' research and writing skills, and cope with University life. Students are expected to review the materials on the Academic Integrity website at - http://www.yorku.ca/academicintegrity/

2. ACCESS/DISABILITY

York University is committed to principles of respect, inclusion and equality of all persons with disabilities across campus. The University provides services for students with disabilities (including physical, medical, learning and psychiatric disabilities) needing accommodation related to teaching and evaluation methods/materials. These services are made available to students in all Faculties and programs at York University.

Student's in need of these services are asked to register with disability services as early as possible to ensure that appropriate academic accommodation can be provided with advance notice. You are encouraged to schedule a time early in the term to meet with each professor to discuss your accommodation needs. Please note that registering with disabilities services and discussing your needs with your professors is necessary to avoid any impediment to receiving the necessary academic accommodations to meet your needs.

Additional information is available at the following websites:

Student Counselling, Health & Well-being - **https://students.yorku.ca/counselling**

York Accessibility Hub - **http://accessibilityhub.info.yorku.ca/**

3. RELIGIOUS OBSERVANCE ACCOMMODATION

York University is committed to respecting the religious beliefs and practices of all members of the community and making accommodations for observances of special significance to adherents.

Please note that to arrange an alternative date or time for an examination scheduled in the formal examination periods (December and April/May), students must complete an Examination Accommodation Form (https://registrar.yorku.ca/pdf/exam-accommodation.pdf) and submit it to the course director at least 3 weeks before the final exam.

For requests regarding test, requests must be received by the course director at least 2 weeks in advance (there is no equivalent online form).

4. STUDENT CONDUCT IN ACADEMIC SITUATIONS

Students and instructors are expected to maintain a professional relationship characterized by courtesy and mutual respect. Moreover, it is the responsibility of the instructor to maintain an appropriate academic atmosphere in the classroom and other academic settings, and the responsibility of the student to cooperate in that endeavour. Further, the instructor is the best person to decide, in the first instance, whether such an atmosphere is present in the class. The policy and procedures governing disruptive and/or harassing behaviour by students in academic situations is available at –

http://secretariat-policies.info.yorku.ca/policies/disruptive-andor-harassing-behaviour-in-academic-situations-senate-policy/

ADDITIONAL NOTE

Numerous students in Faculty of Science courses have been charged with academic misconduct when materials they uploaded to third party repository sites (e.g. Course Hero, One Class, etc.) were taken and used by unknown students in later offerings of the course. The Faculty's Committee on Examinations and Academic Standards (CEAS) found in these cases that the burden of proof in a charge of aiding and abetting had been met, since the uploading students had been found in all cases to be willfully blind to the reasonable likelihood of supporting plagiarism in this manner. Accordingly, to avoid this risk, students are urged not to upload their work to these sites. Whenever a student submits work obtained through Course Hero or One Class, the submitting student will be charged with plagiarism and the uploading student will be charged with aiding and abetting.

Note also that exams, tests, and other assignments are the copyrighted works of the professor assigning them, whether copyright is overtly claimed or not (i.e. whether the © is used or not). Scanning these documents constitutes copying, which is a breach of Canadian copyright law, and the breach is aggravated when scans are shared or uploaded to third party repository sites.