

**PHYSICAL CHEMISTRY I
CHMB20H3
LECTURE OUTLINE
Fall 2014**

Welcome to CHMB20H3: Physical Chemistry: Thermodynamic and Kinetics:

Lecturer: [Dr. Farkhondeh Fathi](#) (SW-640)

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| <u>Office Hours (in SW-640):</u> | Thursday | 1:30-3:0 pm |
| Starting Tuesday, Sept 9th | Tuesdays | 1:30-3:0 pm |

General Information about the Course:

Physical chemistry is that subdiscipline of chemistry that seeks to explain chemical systems, including gases, liquids, solids, solutions, etc. in terms of basic physical principles. Physical chemistry is the most fundamental of all the subfields of chemistry, so learning it is required for all chemist. As other areas such as organic chemistry, inorganic chemistry, materials chemistry, nanoscience, medicinal chemistry, biochemistry,... are built upon the foundation of physical chemistry. In this course you learn about thermodynamic and chemical kinetics. Thermodynamics studies the transformation of energy into different forms and its relation to macroscopic variables such as temperature, pressure, and volume. Chemical kinetics deals with the rates and mechanisms of chemical reactions.

Learning Outcome:

- 1- Introduce thermodynamic laws, understand their implications, and become familiar with their applications
2. Understand physical transformations in pure materials as well as the properties of simple mixtures
3. Understand reaction rates and explore integrated rate laws for either elementary or complex chemical reactions

The Importance of Math in the Course:

Chemistry is a quantitative science rather than a descriptive one and answers in it are expressed as real numbers corresponding to observable properties of a system. In order to get such numerical values, you must be able to translate a complicated situation into an appropriate mathematical equation and then use math techniques to solve them.

So, if you feel that your calculus is a bit shaky, I recommend you work on some problems about differentiation and integration in your textbook for calculus of a single variable. For other math topics, such as series, limits, partial differentiation, the textbook (Physical Chemistry Atkins Ed.

10th) has an excellent math supplement. Fortunately UTSC teaching and learning center also has **Math & Statistics Learning Centre!** which helps students to overcome their problems in this area. For more information see: <http://ctl.utsc.utoronto.ca/mslc/>

Textbook:

Atkins' Physical Chemistry, Tenth Edition (Volume 1), Peter Atkins and Julio de Paula

Course Website: CHMB20 maintains a Blackboard web space which archives a variety of course-related information including: class announcements, lecture slides, contact information and links to some useful outside resources. In addition, class emails will regularly be sent via Blackboard. *In order for you to receive these emails, you must have a valid "utoronto.ca" email account registered with ROSI.*

Extra Resources:

a) Facilitated Study Groups

In this course, we will be offering Facilitated Study Groups (FSGs) through CTL. Facilitated Study Groups (FSGs) are weekly study sessions open to all students taking CHMB41, and who want to improve their understanding of course material, improve their study techniques, and improve their grade. Attendance is voluntary. In FSGs you'll compare notes, discuss important concepts, develop study strategies, and prepare for exams and assignments on course material. Course material is NOT re-lectured. FSGs are lead by a trained facilitator who has previously taken the course. Research shows that students who attend FSGs regularly can achieve better grades. A survey will be taken during the first week of class to determine the best days and times for most students, and then the FSGs will start (probably the second or third week of class). Those days, times, and session locations will be announced in class, posted on our course page, and at :<<http://ctl.utsc.utoronto.ca/home/fsg/>>. Attend as many sessions as you want!

b) Tutorials

Tutorial sections are as follows:

Mondays TUT0001 19-20 pm, BV 355

Mondays TUT0002 19-20 pm, BV361

Tuesday TUT0003 16-17pm, AA206

The questions which will be discussed in the tutorials are similar to some exam questions!

Attendance at tutorials is mandatory and will count towards your final grade (see grading scheme below). You are allowed to miss one tutorial without penalty; however, each additional absence will cost you 1 point from your 24 homework points. Rescheduling of missed tutorials will not be permitted.

For being successful in this course I strongly recommend everyone attend FSG and Tutorials

Lecture Schedule: This is a ROUGH GUIDE only and may change throughout the term. Check for updated lecture schedule based on notes posted on Blackboard and announcements in class.

| Ch. 10 th Ed | Subject |
|--|--|
| 1A, 1C | The properties of gases |
| 2A, 2B, 2C (exclude 2C.4), 2D, 2E | The first law |
| 3A, 3B, 3C, 3D | The second and third law |
| 4A, 4B (Exclude 4B.3) | Physical transformation of pure substances |
| 5A, 5B, 5C, 5E (exclude 5C3-4, 5D, 5F) | Simple mixtures |
| 6A | Chemical Equilibrium |
| 20A, 20B, 20C (not 20C.2), 20E, 20H | Chemical Kinetics |

Methods of Evaluation: The tentative grading scheme for the course is shown in the table below:

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|----------------------|------|
| Term Test * | 25% |
| Final Exam | 45% |
| Assignments (4×6) | 24% |
| Project | 6% |
| Extra Credit Project | 1.5% |

* **There may be a makeup for term test with appropriate documentation**

Marked Term Test : an announcement will be made, in lecture and/or on the intranet and Blackboard, when tests are marked. You have one week to check your test with Dr. Farkhondeh Fathi, during any office hours, or other announced times. Re-marking claims will only be considered for one week after the announcement has been made. Claims must be accompanied by a written statement, outlining the reasons (referenced, if necessary) to support your claim for extra marks.

Homework:

There are 4 sets of homeworks. Homework contributes 24% of the final grade. Students are permitted and encouraged to discuss lectures and homework as a part of the learning process. For most homework assignments, this means that students may discuss approaches to solving problems. However, the final solutions and written preparation must be done independently. Assignments that are nearly identical or copied may be considered as academic dishonesty. No late homework will be accepted after the solutions have been posted. The purpose of homework is to give students a better command of principles by applying them to problem solving. Numerical work will often be involved, and doing this correctly is important. The deadline of each homework is 1 week after posting on the blackboard at 5:0 pm. I may also give you a hardcopy during the lecture sections. You should drop your homework in the determined boxes at 6th floor on science wing no later than 5pm. Penalty for late submission after 5 pm is 10% per day . More details will be posted on blackboard

Suggested problems:

I will post the suggested problems at the beginning of each chapter. Solving and discussing these problems with your instructor, TAs and classmates are strongly encouraged. As this process assist you to learn concepts more deeply and get higher mark in home works and exams.

Project:

While we will spend most of our time learning fundamentals of physical chemistry, this course also encourages you to view the application of it through the application perspectives of physical chemistry. To achieve this goal, you will be asked to work in a group of 7 to design an experiment for measurement either thermodynamic or kinetic parameters in lab. Each group should assign a group leader who is in charge of project management, sending email to me related to the project and submission. Each group can choose any topics that are of interest to them, the deadline to choose the title, group leader and teammates is on Monday September 29nd, 2014. If 2 groups come up with the same project idea, the one which has sent me the project title first, has priority and the other one should choose a new one in 1 week, so I suggest you to have at least 1-3 ideas for the project.

The experiment should be fun, simple, doable, cost-effective, engaging, related to the content of this course, be fitted into 4 hour lab section, be appropriate for 2nd year chemistry students and bring theoretical concept into experimental learning.

You can use any available resources; however, make sure you do not copy from other universities lab manual; this will be considered as an academic integrity. Make sure to include all references which have been used. The project will be submitted by group leader on a CD or USB along with a hard copy and group members names. The file should include the experiment procedure including title, objective, theoretical background, required chemicals, glassware or instruments, step by step procedure, pre-lab and post-lab questions and data-sheet (word file), group picture, and a power-point presentation which provides required theoretical or lab skill

background related to it. It is possible that you see a question about your own project in your final exam, so make sure you collaborate effectively in the project. Any other creative work related to this project has extra mark.

The deadline for the project submission is on Monday November 10th at 5 pm. Unfortunately any late submission will not be accepted.

TURNITIN.COM

Normally, each group will be required to submit their project to Turnitin.com for a review of textual similarity and detection of possible plagiarism. In doing so, each group will allow their project to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site.

E-mail policy:

- Use UTSC account
- If Yahoo or Hotmail used follow instructions below to prevent email ending up in junk mail:
 - put CHMB20 in the subject line followed by the reason for the email
 - use a greeting of some kind - NOT "Hey"
 - sign your first and last name
 - please include your student number after your name
- Student emails will be replied to within 36 hours (M-F) provided that the above protocol is used.

A note on email content: Please do not email questions regarding the lecture material/assigned reading/suggested problems.

AccessAbility: Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach us and/or the AccessAbility Services Office as soon as possible. The UTSC AccessAbility Services staff (located in S302) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations (416) 287-7560 or ability@utsc.utoronto.ca. The sooner you let us know your needs, the quicker we can assist you in achieving your learning goals in this course.

Cell Phones: During lectures, please turn off your cell phones to avoid disruption of the class. If circumstances warrant use of your cell phone and you must receive an emergency call, please inform the instructor in advance at the beginning of the session, and excuse yourself from class to receive the call. [Cell phones are absolutely prohibited in the laboratory.](#)

Academic Calendar: Further information about academic regulations and course withdrawal deadlines can be found in the UTSC Calendar. You are encouraged to read this material.

Centre for Teaching and Learning: If you need assistance with effective writing skills, study skills, exam preparation, note taking, or time management, free workshops and advice are

available from the Center for Teaching and Learning, which can be reached at: http://www.utsc.utoronto.ca/~ctl/Student_Support/index.html

Academic Integrity:

Academic integrity is one of the cornerstones of the University of Toronto. It is critically important both to maintain our community which honours the values of honesty, trust, respect, fairness and responsibility and to protect you, the students within this community, and the value of the degree towards which you are all working so diligently.

According to Section B of the University of Toronto's Code of Behaviour on Academic Matters <http://www.governingcouncil.utoronto.ca/policies/behaveac.htm> which all students are expected to know and respect, it is an offence for students to:

- To use someone else's ideas or words in their own work without acknowledging that those ideas/words are not their own with a citation and quotation marks, i.e. to commit plagiarism.
- To include false, misleading or concocted citations in their work.
- To obtain unauthorized assistance on any assignment.
- To provide unauthorized assistance to another student. This includes showing another student completed work.
- To submit their own work for credit in more than one course without the permission of the instructor.
- To falsify or alter any documentation required by the University. This includes, but is not limited to, doctor's notes.
- To use or possess an unauthorized aid in any test or exam.

There are other offences covered under the Code, but these are by far the most common. Please respect these rules and the values which they protect. Offences against academic integrity will be dealt with according to the procedures outlined in the Code of Behaviour on Academic Matters.

The most serious offence is impersonation of another student. This applies if you use multiple clickers or bring other students' clickers to class and use them to vote. I will be enforcing this policy strictly in class. Any student in violation of this rule and using multiple clickers will have them confiscated and will forfeit the 5% mark for the participation mark for the clickers. If the offence is repeated, the student will be reported to the Chair and Dean for academic offenses and will have to meet with them in person to explain their actions.