

Problem Solving in Chemistry

CHEM 2000 3.0

Three lecture hours

Prerequisite: Chem 1000, 1001, Math 1013, 1014 (corequisite)

Time: TR 9:30 – 11:00 am

Location: HNE B15 (T) and Ross South 205 (R)

Course Director

Toby Zeng

Email: tzeng@yorku.ca

Office: CB208

Office hour: to be arranged by email

Course Description. This course covers knowledge in multivariable calculus, complex number, ordinary differential equation, linear algebra, vector, probability, and numerical analysis. The knowledge is introduced in the context of chemistry, especially in thermodynamics, reaction kinetics, electronic motion, transport phenomena, and experimental data analysis.

Course Objectives. The overall objective is to enhance students' solving skills in chemistry-related mathematical problems, so that students are prepared for 3rd and 4th years advanced chemistry courses.

Recommended texts and references:

Mathematics for Physical Chemistry, Opening Doors – D. A. McQuarrie

Tentative Evaluation: Written assignment – 20%; 2 Midterms – 20% each; Final exam – 40%

Course policies:

1. Email etiquette:

- **You must use your YorkU email address and put "Chem 2000" in the subject line.** Emails not conforming to the rules may go into the spam folder and will not receive a response.
- As a courtesy and being respectful to your correspondent, write your email professionally (i.e. text-messaging language is unacceptable). Questions regarding calculations or involving equations should be avoided and are best discussed in person during office hour.

2. Missed exam:

- **If you miss a midterm**, no document is required. The weight of the missed midterm will be added to the final exam automatically. **Alternative marking scheme does not apply. It is in your best interest to take the midterms and use them as practice.**
- Deferred standing for final exam is rarely granted and petition to your home faculty will be required. A two-day notice will be given for the makeup final exam. Denied petitions will result in a zero on the final exam. See <http://www.registrar.yorku.ca/petitions/academic/> for information.

4. Re-grading of midterm exam:

- If you believe a written answer on a test was marked incorrectly, you must resubmit to me in person detailing your rationale within 5 business days of the return of the exam. **ONLY** those answers written in ink are eligible for re-marking. **NOTE:** re-marking can result in the mark being raised, confirmed, or lowered.

5. Academic Honesty

- **Any student who breaches York's Academic Honesty Policy will be charged.** It will at minimal result in a visit to the Associate Dean's office. Some offences include:
 - o Plagiarism
 - o Students who submit any material for remarking that has been modified in any manner to misrepresent the original assessment

6. About assignments.

- Each assignment contains 8 questions. Each question is worth 10 points. Handing-in a decently completed assignment itself is worth 20 points. Together, each assignment is worth 100 points. I will randomly choose 10 handed-in assignments to grade. **Finishing the assignment is of critical importance, since the questions in exams will be very similar to those in problem sets.**

Important Information for All Students:

All students are expected to familiarize themselves with the following information, at <http://secretariat-policies.info.yorku.ca/>.

- York's Academic Honesty Policy
- Policy on Accommodation for Students with Disabilities
- Code of Student Rights and Responsibilities
- Policy on Religious Observance Accommodation

CHEM 2000 Problem Solving in Chemistry

Instructor: Toby Zeng, tzeng@yorku.ca, CB 208.

Course format: All lectures will be given in-person. There will be no live broadcasting. The lectures will be recorded and the recordings will be posted on the eClass page for courtesy.

Office hour: TBD.

Textbook: Mathematics for Physical Chemistry: Opening Doors, by Donald A. McQuarrie. Chapters 3, 5, 6, 12, 13, 14, 17, 18, 19, 21, and 22 are covered in this course.

Website: eclass.yorku.ca

Course Outline:

1. Multivariable functions and their calculus, in the context of thermodynamics
2. Probability, in the context of statistical thermodynamics and error analysis
3. Ordinary differential equations, in the context of chemical kinetics and quantum chemistry
4. Vectors, in the context of particle motions and transport phenomena
5. Determinant and matrix, in the context of geometry operation and chemical kinetics
6. Statistics and numerical methods, in the context of data analysis

Learning Objectives:

1. The overall objective is to enhance students' solving skills in chemistry-related mathematical problems, so that students are prepared for 3rd and 4th years advanced chemistry courses.