

SC/CHEM 1001 3.0 M  
Chemical Dynamics - Winter 2015  
GENERAL INFORMATION

<u>Lecturer</u>	Dr. W. Pietro	138 Petrie Building 736-2100, local 77700
<u>Course Director</u>	Dr. M.R. Hempstead	102 Life Sciences Building 736-2100, local 33523
<u>Secretary</u>	Sefath Irasha	102 Life Sciences Building 736-5312

FORMAT

The course consists of 6 laboratories and approximately 30 lecture hours. Additional assistance is available at the tutorials on Thursday mornings, as well as at Help Room and Peer Mentoring sessions. It is also expected that you will devote 6-8 hours per week to private study for this course.

LECTURES

Attendance at lectures is not compulsory, but is essential. Lectures will present the course material in ways which differ from those in the textbook and which may be more helpful to you. In addition, important announcements are made regularly in lectures and each student is responsible for knowing about them. One hour lectures are scheduled for Monday, Wednesday, and Friday at 11:30 a.m. in Curtis Lecture Hall L. Lectures will not be held from February 16 through February 20 (Reading Week).

TEXTBOOK

"General Chemistry", Custom Edition (based on tenth edition).  
R.H. Petrucci, F.G. Herring, J.D. Madura and C. Bissonnette  
Publisher: Prentice Hall.

**MOODLE SITE**

The Moodle site for this course is an essential reference for notes, problem sets and solutions, announcements and administration of the course. For information on how to use Moodle, follow the instructions in the Student Quickstart Guide available at the following site:

[https://moodle.yorku.ca/students/documentation/quickstart\\_guide.html](https://moodle.yorku.ca/students/documentation/quickstart_guide.html)

***The Moodle site is a critical reference for this course and should be checked on a regular basis.***

COMMUNICATION

General course enquiries may be directed to the course secretary (sefa570@yorku.ca); all such communications must use a York e-mail address and must be properly signed (first name, last name and student number); unsigned messages will not be answered. All communications should use a valid York e-mail address and should be properly signed (first name, last name and student number). Unsigned messages won't be answered.

## QUIZZES

Quizzes will be held during the tutorial period (Thursdays 8:30 - 9:20 a.m.) January 29, February 26, and March 26. The material to be tested in each quiz will be announced in a lecture near the time that it will be written. Room allocations for quizzes will be announced in class and posted on the Moodle site. Absence from quizzes or labs due to illness or other legitimate cause should be reported to the course secretary as soon as possible. ***Supporting documentation for an illness must be completed by a physician within three business days of the absence. The physician must be able to confirm you were too ill to attend the quiz; the assessment cannot be based simply upon your description. Acceptable supporting documentation include the “Attending Physician’s Statement” from the Registrar petitions package ([http://www.registrar.yorku.ca/pdf/attend\\_physician\\_statement.pdf](http://www.registrar.yorku.ca/pdf/attend_physician_statement.pdf)) or a note of similar detail. Any documentation presented more than two weeks after an absence will not be accepted for consideration. Failure to meet any of these guidelines will require additional documentation for assessment for an extension.***

## ADDITIONAL SUPPORT

- ***Tutorials*** will be held on Thursdays at 8:30 a.m. in Curtis Lecture Hall L on those weeks when quizzes are not scheduled.
- ***Help Room sessions*** will be scheduled on the weeks of quizzes. Faculty from the chemistry department will be available to assist with lecture material and problem sets.\*
- ***Peer Mentoring sessions*** will also be offered every week by students who have completed the course and achieved a mark near the top of the class.\*
- ***Office hours*** will be held by Dr. Pietro in PS 138 from 1:30 - 3:30 p.m. on Wednesdays.

\* Schedules for the Help Room and Peer Mentoring sessions will be circulated shortly. If you cannot come at the scheduled times, contact Dr. Pietro to get additional assistance.

## LABORATORIES

Check the schedule on the Moodle site to see when the laboratories begin. *Before the labs begin*, students must pick up the lab manual from the First-Year Chemistry Office (LSB 102). The manual contains a week-by-week timetable of lab activities. All laboratories will be held in the Life Sciences Building. Students must attend all laboratories in the lab class in which they are registered.

## PROTECTIVE EQUIPMENT IN THE LABORATORY

Some of the regulations from the *Occupational Health and Safety Act* that are relevant to protective equipment in the laboratory are given below. Students who do not abide by these regulations will not be permitted to perform the experiments and will be removed from the lab.

1. ***Safety Glasses or Goggles:*** Safety glasses or goggles must be worn in the laboratory at all times. The glasses worn must provide protection from the side as well as the front; prescription glasses do not provide adequate protection. Safety glasses may be purchased from the University Bookstore. If contact lenses are worn, protective goggles must be used as well.
2. ***Lab Coats and Dress Code:*** Lab coats are mandatory as part of your personal protective equipment for the laboratory and may be purchased from the York Bookstore. Arms, legs and feet must be covered while working in the laboratory. Protective gloves are available for those experiments in which they are necessary. Open-toed shoes or sandals are not permitted in the lab.

## GRADING POLICY

The grade for each student is calculated from performance in quizzes, labs and a final examination.

**Both the lecture and laboratory components must be passed independently to pass the course.**

Marks are allocated approximately as follows:

<u>Lecture:</u>	Quizzes _____	40%
	Final Examination, 2 hours _____	40%
<u>Laboratory:</u>	Experimental Work _____	20%

The overall quiz mark for the course will be based on the best two of the three quizzes. If a student is excused from one quiz (see guidelines above) then the overall quiz mark will be the average of the two quizzes that are written. If a student is excused from one lab (see guidelines above), the weight of that lab will be transferred to the others that are performed. If a student misses more than one quiz or one lab they must contact Dr. Hempstead to discuss how they will be accommodated. **Please Note:** If the course is being repeated, it is possible to be exempted from lab work if all labs were performed and passed. Please contact Dr. Hempstead if you have questions about lab exemptions.

## IMPORTANT COURSE INFORMATION

All students are expected to familiarize themselves with the university policies on Academic Honesty and Integrity, Services for Students with Disabilities, Religious Observance Accommodation, and the Code of Student Conduct. This information is available on the York Secretariat website. (See the Moodle site for a link to this information.)

***Breaches of academic honesty will not be tolerated.*** Students who breach York's Academic Honesty Policy will be charged. Here are some examples relevant to this course:<sup>1</sup>

- students who have an old lab report, or any other unauthorized aid, in the lab will be charged
- students who submit any material for remarking that has been modified in any manner to misrepresent the original assessment will be charged<sup>2</sup>
- students who misrepresent themselves during a lab, quiz or examination or provide documentation for absence from any of these that is not legitimate will be charged

## GENERAL

The rate at which material is covered in this course is high - don't fall behind. Develop a regular schedule of study times. Plan ahead and use your time wisely. Allocate definite times in each week for studying for all your subjects, and don't forget a reasonable amount of time for exercise and social life. You will need an experimental approach to develop your own timetable and it will need to be flexible, but it is a great help for developing good study habits. The emphasis in this course is on quantitative problem-solving which is a more advanced skill than just understanding the textbook. It is developed and improved with practice.

Problem sets have been provided, with solutions, on the Moodle site. If you wish to obtain additional material for practice, copies of old CHEM 1001 tests and exams are available the Chemical Society at York in room 206 in the Chemistry Building. Try to solve the problems yourself first, then look at the solutions. Ask questions - after lectures, in laboratories, or in the tutorials.

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<sup>1</sup>This is not intended to be an all-inclusive list.

<sup>2</sup>A selection of marked quizzes will be photocopied before they are returned.

## **LECTURE OUTLINE - CHEM 1001 3.0 (Chemical Dynamics)**

Chapters and sections refer to the tenth edition of General Chemistry by Petrucci, Herring, Madura, and Bissonnette. The approximate number of lectures in each section are provided.

### **Section 0 Background Material**

Significant figures, SI units, molar mass and the mole, balancing chemical reactions, chemical nomenclature, identifying oxidation states, concentration calculations, basic mathematical skills with algebra, logs and exponentials. (Chapters 1 through 5) Additional material will need to be reviewed prior to each of the lecture sections.

### **Section 1 Chemical Kinetics (~7 lecture hours)**

*Review: Chapter 6 - ideal gas law, partial pressures, distribution of molecular speeds*  
Rate laws, zero-order, first order, second order, elementary reactions, reaction mechanism, Maxwell-Boltzmann distribution of molecular speeds, temperature dependence of reaction rates, collision theory, enzymes and catalysis. (Chapter 14)

### **Section 2 Chemical Equilibrium (~11 lecture hours)**

*Review: Chapter 5 - nature of aqueous solutions, precipitation reactions, acid-base reactions*  
Chemical equilibrium, equilibrium constants, position of equilibrium, (LeChatelier's principle), titration curves, acids and bases,  $K_w$ ,  $K_a$ ,  $K_b$ , pH,  $pK_a$ , buffers,  $K_{sp}$ , solubility equilibria, common-ion effects, salt effects and pH-effects on solubility, fractional precipitation. (Chapters 15, 16, 17, and 18)

### **Section 3 The Driving Force of Chemical Change (Entropy and Free Energy) (~6 lecture hours)**

*Review: Chapter 7 - terminology, state functions, Hess's Law, formation reactions*  
Spontaneous change, entropy, second law of thermodynamics, free energy change and concentration effects, temperature dependence of equilibrium, van't Hoff equation. (Chapter 19)

### **Section 4 Electrochemistry (~6 lecture hours)**

*Review: Chapter 3 - assigning oxidation states; Chapter 5 - general oxidation-reduction principles (balancing redox reactions, oxidizing and reducing agents)*  
Redox reactions, electrochemical cells and potentials, electrochemical work and the Nernst equation, electrolysis. (Chapter 20)