SC/CHEM 1000 3.0 C
Chemical Structure - Fall 2015
GENERAL INFORMATION

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| Lecturer/Course Director | Dr. M. Hempstead | 102 Life Sciences Building<br>736-5312 |
| Course Secretary | Ms. Sefath Irasha | 102 Life Sciences Building<br>736-5312 |

FORMAT

The course consists of 6 laboratories and approximately 27 lecture hours. Additional assistance is available at the tutorials on Tuesday evenings at 6:00 p.m., as well as at 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. Three hour lectures are scheduled for Tuesdays at 7:00 p.m. in Curtis Lecture Hall I.

TEXTBOOK

"General Chemistry", Revised 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. To get access to this Moodle site follow the instructions in the Student Quickstart Guide available at the following site:

http://moodle.yorku.ca/students/quickstart_students.pdf

***The Moodle site is a critical reference for this course and should be checked regularly throughout the term for special announcements.***

COMMUNICATION

All general course enquiries should be directed to Ms. Irasha (sefa570@yorku.ca) and lecture related communications should be directed to Dr. Hempstead (mikey@yorku.ca). 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 (Tuesday from 6:00 to 6:50 p.m.) October 6, October 20 and November 24. The material to be tested in each quiz will be announced in lecture. Room allocations for quizzes will be announced in class and posted on the course web site. Absence from quizzes, labs, or examinations 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 that you were too ill to attend the quiz or lab; 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) 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 Tuesdays at 6:00 p.m. in Curtis Lecture Hall I on those weeks when quizzes are not scheduled.
- $ ***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. Hempstead Tuesdays from 1:30 p.m. – 3:30 p.m. in LSB 102.

* Schedules for the Peer Mentoring sessions will be circulated shortly.

LABORATORIES

Check the schedule on the Moodle site to see when the laboratories begin. *Before the labs begin*, 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 are must attend all laboratories in the lab class in which they are registered.

PROTECTIVE EQUIPMENT IN THE LABORATORY

Regulations from the *Occupational Health and Safety Act* that are relevant to the laboratories are given below. The *York University Laboratory Safety Program* provides a thorough description of these regulations (see www.yorku.ca/dohs/documents/LaboratorySafetyManual.pdf). 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 side as well as the front; prescription glasses do not provide adequate protection. Safety glasses may be purchased from the York 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.

## "MasteringChemistry" HOMEWORK ASSIGNMENTS

MasteringChemistry is an online homework system that includes tutorial support to provide direction to the correct answer. Assignments will be due approximately every other week (all due dates are provided on the MasteringChemistry site). Links to these assignments and details of the grading, etc. are provided on the Moodle site. **Please Note:** The "Introduction on MasteringChemistry" exercise will NOT count towards the mark used to calculate your grade. The overall mark for MasteringChemistry will be determined by adding the scores for all six assignments and calculating a mark out of 50 (60 total marks are available). The maximum mark for MasteringChemistry will be 100%. There will be no extensions or exemptions granted for any of these assignments for medical reasons or any other grounds.

## 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:

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| Lecture: | "MasteringChemistry" Homework Assignments | 5% |
| | Quizzes | 40% |
| | Final Examination, 2 hours in December | 35% |
| Laboratory: | 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 web site. (See the Moodle web site for a link to this information.)

***Breaches of academic honesty will not be tolerated.*** Students who break the university policies will be charged. Here are a few examples that apply to this course:[1]

- students who bring old lab reports into 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[2]
- 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

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[1] This is not intended to be an all-inclusive list.

[2] A selection of marked quizzes and labs will be photocopied before they are returned.

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 1000 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.

(See lecture outline on next page.)

LECTURE OUTLINE - CHEM 1000 3.0 (Chemical Structure)

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

**Section 0 Assumed Background Material**

SI units, uncertainties, significant figures, properties of matter, atoms and nuclei, atomic mass, molecular mass, the mole, the use of the mole in calculations, chemical compounds, chemical reactions, EM Radiation, Atomic spectra, Bohr atom, Hydrogen atom, basic math primer in use of algebra, logs and antilogs, etc. This material is presumed to be generally familiar to all students. Its understanding is assumed in all lectures and in the laboratory. All students should review this material. Of particular importance are sections 1-5 to 1-8 which deal with units, uncertainties, significant figures and problem solving.(Chapters 1, 2, 3, 4 and overview of chapters 8 and 9)

**Section 1 Gases (~6 lecture hours)**

Macroscopic Gas Laws: Boyle's, Charles' and Dalton's laws. The ideal gas equation and its applications. Real gases, compressibility factor, intermolecular forces, the kinetic molecular theory of gases, assumptions and predictions. (Chapter 6-1 through 6-9)

**Section 2 Thermochemistry (~4 lecture hours)**

Thermodynamic quantities (heat, work, internal energy, enthalpy), the first law of thermodynamics. Applications to chemical reactions (Hess's law, heats of formation, heat capacity, calorimetry, fuels). (Chapter 7-1 through 7-9)

**Section 3 Atomic Theory & Periodic Table (~6 lecture hours)**

Quantum theory, quantum numbers, spdf orbitals, electron spin, electronic configurations. The periodic table and some atomic properties. Periodicity of atomic sizes, ion sizes, ionization energies, electron affinity, magnetic properties. (Chapter 8 and 9)

**Section 4 Chemical Bonding (~6 lecture hours)**

Ionic and covalent bonding, Lewis structures & resonance, VSEPR models, Bond Energies, Hydrogen bonding, van der Waals forces, Valence bond theory with examples using organic molecules. (Chapter 10, 11-1 through 11-4, 11-6, 12-1)

**Section 5 Solids and Liquids (Structural) (~3-4 lecture hours)**

Properties of liquids (mean intermolecular distances, surface tension and related properties), structure of water. Solids: cubic, fcc and bcc structures, ionic, network covalent. (Chapter 12)