Chemistry 0010 Course Outline
Introductory Chemistry
2015-16

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Office Hours: extra help will be available on Friday mornings. The time will depend on student schedules.

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Course Description
Chemistry 0010 is equivalent to the Ontario Grade 12U level chemistry. Some topics from Grade 11U are also covered. Topics to be studied include; atomic theory, molecular structure, types of chemical reactions and stoichiometry, thermochemistry, kinetics, equilibrium, oxidation and reduction reactions and organic chemistry. Laboratory work will be an important component of this course.

Course Times
The schedule for lectures, tutorials, labs and midterms will be handed out in class.

Monday classes (lectures, tutorials or midterms) 2:30 - 4:30 p.m. St. James 202
Thursday classes (lectures, tutorials or midterms) 2:30 - 4:30 p.m. St. James 202
Tuesday labs: 2:30 pm., 4:30 pm. and 6:30 pm in MRW 156. Each lab session is two hours long.

Required Materials **All are available at the Western Bookstore**
Chemistry 0010 Notes 2015-16
Chemistry 0010 Lab Manual 2015-16
Lab Coat and scientific calculator

The Notes and Lab Manual are Custom Course Materials. You may have to purchase a voucher and pick up the material the following day.

Course Evaluation

Lab Reports (7 + Introductory Lab)	15 %	
Tutorial Quizzes (6)	15 %	
Midterm Test (November 16)	20 %	(tentative date)
Midterm Test (January 28)	20 %	(tentative date)
Final Exam (scheduled by the Registrar)	30 %	

You must pass the laboratory portion of the course to pass the course (mark ≥ 7.5 / 15) .
All the labs and all the tutorial quizzes count toward the mark. None are 'dropped'.

Laboratory Requirements
A lab coat is mandatory and may be purchased at the Western bookstore. Safety Glasses will be provided.

Dress Code: A lab coat, long pants (must come to the ankles), socks that cover the ankles, and closed shoes are mandatory, hair must be tied back, if possible. Students will be asked to leave the lab if these requirements are not met and a mark of zero will be assigned for that lab.

Attendance: All labs count toward the lab mark***. Any student who is more than 5 minutes late will not be permitted to do the experiment.*** The clock in the lab will be used as the basis for this decision. Please contact academic counseling if you miss a lab due to illness or other extenuating circumstances.

Objectives: At the completion of the course, the student should be able to: correctly use lab equipment such as burettes, balances and pipettes; titrate a solution to the endpoint; follow written instructions; record pertinent observations; use experimental data to complete calculations using the correct number of significant figures; compare their data to 'real' data and make constructive suggestions as to why there may be differences.

Tutorials
There will be six, in-class, tutorial tests throughout the year. The first 40 minutes of the class will be an opportunity to ask questions and get help, followed by a quiz. Please contact academic counseling if you miss a tutorial test due to illness or other extenuating circumstances.

Contacting Students
Students will receive email at their UWO address only. Schedules and assignments will be distributed this way. This information will also be available through the course website. Please check for email on a regular basis.

Absences
Absence from any activity that is marked (labs, tutorial tests and midterms) must be dealt with by academic counseling. Documentation will be required.

Department Policy: For academic accommodation to be considered for any course component worth less than 10% of the final course grade, it is the responsibility of the student to approach the course instructor(s) in a timely fashion. Documentation may be required to be submitted to the academic advisor. If documentation is required, the request for accommodation will be decided by the academic advisor in consultation with the instructor. If documentation is not required, the instructor will make the final decision. The policies governing requests for academic accommodation for course components worth 10% or more of the course grade are outlined in the Academic Policies section included at the end of the course outline.

Late Assignments
Lab reports are marked out 10. Any that are handed in *late* will have *one mark per day* deducted and will not be accepted once the marked reports have been returned to the other students, unless documentation is received from academic counselling. Lab reports are usually due on the Thursday following the Tuesday lab period.

Code of Conduct
All classes will start promptly. Please bring the course notes and a calculator to class. It is expected that you will come to class prepared to listen and ask questions.

Some Suggestions
If you are having trouble with any of the concepts, contact the instructor and ask for help as soon as possible. Attendance is strongly correlated to the mark achieved in this course. Math skills are also quite important. Some additional classes will be available for those that need more instruction with math. An assessment will be given to evaluate your math skills and does not count toward the course mark.

This is a problem solving course. There are lots of examples for you to follow in the Course Notes. However, it is very difficult to do well in this course without doing the problems on your own. There are lots of questions in the Course Notes. The final answers to most of the questions are given in the course notes and the **full solutions are on course website.** Do not just read the solutions. Do as many as you need to grasp the concept. Practice exams will be provided. Chemistry textbooks will be available in the library as reference. This course has a heavy workload and it can be difficult to catch up once you fall behind.

Topics And Objectives

The *objectives* listed with each topic will not cover every type of question that will be asked. For each topic the student should be able to:

Chemistry: the Study of Matter
identify the major parts of an atom; distinguish between chemical and physical properties; name simple compounds

The Mole
solve calculations involving Avogadro's number, moles, molar mass, molarity, and the composition of compounds or mixtures

Chemical Reactions and Stoichiometry
write and balance specific types of reactions and carry out calculations, using stoichiometry, involving amounts of products made and reactants used; determine oxidation states, solubility, and pH; determine the limiting reagent and yield

Atomic Theory
describe the historical development of the structure of the atom and arrangement of the electrons; use conventional methods to describe the arrangement of the electrons in atoms and ions (electron configuration, orbital box notation, quantum numbers)

Periodic Properties
use core charge and the distance of an electron from the nucleus to explain the trends in the periodic table with respect to atomic size, ionization energy, electron affinity and electronegativity

Structures and Bonding
describe the types of bonding that occurs between elements from different parts of the periodic table: metallic, ionic and covalent

Lewis Structures
apply the rules for Lewis structures to draw molecules with covalent bonds and determine some features of the compound such as resonance and bond order

VSEPR Rules for Molecular Shapes
apply the VSEPR theory rules to determine the shape of a compound at a central atom, the hybridization of the central atom and the polarity of the compound

Intermolecular forces
determine the type and relative strength of the forces that exist between molecules based on their structure

Ideal Gases
use the Ideal gas law to carry out calculations involving one gas or a mixture of non-reacting gases; identify the forces that account for differences between an ideal and real gas

Thermodynamics
calculate the energy changes involved in various processes such as heating, cooling, changes of state and chemical reactions; distinguish between energy change and enthalpy change; use Hess's Law to determine the enthalpy change for a reaction; write formation reactions; use calorimetry to determine the heat of a reaction; describe entropy and Gibb's Free Energy

Kinetics
use stoichiometry to describe the relationship between the rates of reaction of the various components of a reaction; use Collision Theory to explain the factors affecting the rate of a reaction; given the appropriate information determine the rate law for a specific reaction; identify the order of a reaction, the intermediates and any catalysts; calculate the half life time or concentrations involved in first order reactions; carry out calculations using the Arrhenius equation

Chemical Equilibrium
write the equilibrium constant expression for a given reaction and carry out simple calculations; use Le Chatelier's Principle or the reaction quotient to determine the direction in which a reaction will proceed; use various strategies to simplify calculations involving equilibrium constants; write the equilibrium reaction and carry out calculations for equilibrium situations involving low soluble salts, weak acids, weak bases, salts or buffer solutions; identify various titration curves, choose an appropriate indicator for a titration

Redox Reactions
determine the oxidation state of an element; balance a redox reaction and identify the species being oxidized or reduced

Electrochemistry
identify the parts of an electrochemical cell; write cell notations; use the cell potential to determine the spontaneity of the reaction; use Faraday's Law to calculate various parameters such as current, time or the amount of product in an electrolytic process

Organic Chemistry
identify various organic functional and family groups; name simple compounds; identify conformers, structural isomers and geometric isomers; describe properties relative to other family groups; identify several common types of organic reactions, draw/name the product of the reactions of several types of organic compounds

Polymers
identify the two types of reactions used to make polymers; given the starting materials draw the polymer that could be made, identify the common polymers