# Trent University Department of Chemistry

## CHEM 1010H: Introductory Chemistry II

## 2017 Winter

## Peterborough

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| Instructor: | | Email: | |
| Office Location: | Office Hours: | | Telephone: |

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| Lab Coordinator: Sue Landary | Email: [slandry@trentu.ca](mailto:slandry@trentu.ca) |
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| Academic Administrative Assistant: | Email: [chemistry@trentu.ca](mailto:chemistry@trentu.ca) |
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Course Description: Essential aspects of physical, inorganic, organic, and biological chemistry. Topics include redox chemistry, kinetics, thermodynamics, and an introduction to inorganic, organic, and biological chemistry.

Course Pre-requisites: Chem 1000H or equivalent or permission of the instructor. Please note: this course assumes every student has previous experience with chemistry at the high school level. Students with no previous experience in chemistry may find the course challenging, but may take the course with permission from the instructor. It is the responsibility of all students to ensure they are up to date with the content.

### Required Resources

1. Laboratory Coat and Laboratory Safety glasses are required for laboratory experiments; you are not permitted entry into the laboratory room without them. If you do not have appropriate safety attire for labs you will not be permitted to perform experiments on your day; no rescheduling is possible.
2. Clickers (Personal Response Systems): Each student is required to have an iClicker personal response system device or the iClicker REEF mobile app subscription. These devices allow real-time interaction, in class, with the instructor for multiple-choice questions related to course material. As clicker records are used in this course to compute a portion of course grades, the use of a clicker or REEF account other than your own is an academic offence. In lecture or tutorial, possession of a clicker other than your own or accessing a REEF account other than your own may be interpreted as intent to commit an academic offense.
3. Textbook: A Molecular Approach, 2nd Canadian Edition, Nivaldo Tro, 2016, Pearson.

Note: this resource is also available as an e-book from the Trent bookstore or publisher’s website. This is an acceptable alternative to purchasing the physical text.

1. Mastering Chemistry Online Homework Access Code. All students are required to have a MasteringChemistry license for the Assignments component of Chemistry 1010H. This resource is included with all new textbooks and e-books, but can also be purchased separately for students who do not intend to buy the textbook or have purchased a used text. A single access code can be used for up to 4 courses, and lasts 24-months before expiry.
2. LearningSystem Course Website (Blackboard): Chemistry 1010H relies on Learning System (also called Blackboard) for distribution of all course material, grades, assignments, course announcements and other course information. All major course announcements will be made through the Learning System, at which point they are equivalent to being announced “in-class”. You are expected to frequently review the Learning System site; should you have any trouble or questions, please see the instructor. The Learning System environment contains valuable resources for the course including suggested readings, practice problems, and all information regarding laboratory and tutorial. Additional links are provided for information about tests, exams, and supplementary resources that are available for each of these course components.

### Course Format

| Meeting Type | Day | Time | Location |
| --- | --- | --- | --- |
| Lecture | Tuesday | 4:00 pm – 5:50 pm | Wenjack (OCA W101.2) and SC 137 |
| Lecture | Thursday | 5:00 p.m. – 5:50 p.m. | Wenjack (OCA W101.2) and SC 137 |
| Laboratory/Tutorial |  | As per individual student | CSB D116 (lab) and DNA B110.1 (tutorial) |

\* Note: Students who have trouble with their lab section scheduling must contact Sue Landry ([slandry@trentu.ca](mailto:slandry@trentu.ca)) as soon as possible. A laboratory / tutorial slot is the same timeslot for each student but alternates weekly. Each section will be divided into a Group I and a Group II. A schedule for tutorials and experiments is posted in the Blackboard Course Management Site. Tutorials are held in DNA B110.1. Laboratory experiments are held in CSB D116.

### Learning Objectives:

Upon successful completion of this course the student will have:

1. Gained an appreciation for the role that energy plays within chemical reactions, including an understanding of thermochemical terms associated with estimating and measuring energy content of chemical systems. Such terms include internal energy, enthalpy, entropy, and free energy.
2. Gained an appreciation for the importance of energy changes associated with electronic transfer in oxidation‐reduction reactions, providing a framework to understand the basics of batteries, fuel cells, and industrial aspects of electrolysis.
3. Been introduced to the skills necessary to assess chemical reaction kinetics for general reactions, including exposure to the collision model for chemical reactions, and the basic concepts of activation energy and reaction mechanism which leads to conceptual understanding of complex chemical processes.
4. Been exposed to the basics of nomenclature, basic chemical reactions, the importance of functional groups and their chemical properties in organic and biochemical systems.
5. Gained a practical (laboratory) and conceptual understanding of coordination complexes resulting from ligands around inorganic (metallic) systems, as relevant in solution phase systems important for biological chemistry.

An A in this course implies mastery over all the topics described above. Grades of B or C imply that you have a greater or lesser degree of understanding of these topics, with a fair level of competence. A grade of D or lower implies minimal or negligible understanding of the field.

### Course Evaluation

| Course Component | Weighting | Due Date |
| --- | --- | --- |
| iClicker Participation | 5% | In each lecture |
| Pre-Laboratory Quizzes | 5% | 1st attempt completed before each lab; best of two attempts is used |
| Laboratory Practice and Skills | 5% | In each laboratory period |
| Laboratory reports | 20% | Through Blackboard, one week after your lab. |
| Assignments (Mastering Chemistry) | 20% | As per individual assignment, see Learning System |
| Midterm Examination | 15% | Tuesday, February 28, 2 hours, in class |
| Final Examination | 30% | TBD, see exam schedule |
| Total | 100% |  |

Note: The final date to withdraw from winter half courses without academic penalty is Friday March 10, 2017. After this date students remain registered in Winter-term courses and receive final grades.

### Course Component Descriptions

1. iClicker Participation: Sporadically during lectures, iClicker questions are posed to the class. These are multiple choice question designed to help students understand course content.
2. Pre-laboratory quizzes (Learning System): Prior to starting each laboratory, students are asked basic questions about the laboratory experiment and concepts through the Learning System environment. Students are allowed up to two attempts for each quiz. The best grade achieved in any of the two attempts is the student grade for the quiz. At least one attempt must be performed BEFORE a student is allowed to commence the laboratory experiment. Students who have not completed the prelab quizzes prior to the lab may be asked to leave the laboratory environment.
3. Laboratory Practice and Skills: Based on in-laboratory participation and behaviour. This grade is assigned by teaching assistants evaluating the requirements discussed in each week’s laboratory. More details are given in lab.
4. Laboratory: Biweekly, students attend laboratory in CSB D116 to perform experiments for the course. For each experiment, a procedure and a report are available on the Learning System. The report template must be used for submission of the lab report. Each student must complete an original submission of the report for their experimental data.
5. Lab report submission and late laboratory reports: Chemistry 1010H has a strict laboratory lateness policy. Please be aware that your laboratory report is due electronically through the Learning System at 11:55 pm one week after your lab period. You may submit it at any time prior to that date and time. You are allowed one late submission per semester with a penalty of 25% for anything up to 24 hours late and 100% thereafter.
6. Tutorials: One week after your laboratory you will have a two hour tutorial. The tutorial is led by a Teaching Assistant and is an opportunity to work on your laboratory report and the tutorial questions provided through the Learning System.
7. Assignments: Assignments are delivered using the Mastering Chemistry online resource. Up to 6 assignments focussing on applications of the course content will be assigned. Each assignment is due by the date specified in Mastering Chemistry. Late assignments will be penalized at a rate of 12% per day, to a maximum penalty of a 50% reduction on a late assignment until the last day of class.
8. Midterm Test: The midterm test will be entirely multiple choice and will focus on material delivered in lecture. Laboratory material will not be directly examined except where the conceptual material overlaps with lecture content.
9. Final Exam: The final exam will be entirely multiple choice and will focus on material delivered in lecture. The final exam is cumulative, and will cover the entire semester. Laboratory material will not be directly examined except where the conceptual material overlaps with lecture content.

### Weekly Schedule (Tentative)

The topics listed here are a general guideline, and may be subject to minor modifications as the course progresses. This survey is to provide an overview of the content covered in the course.

| Week | Description |
| --- | --- |
| Weeks 1‐2; Ch. 6, 17 | Introduction to energy, thermochemistry, enthalpy, entropy, free energy. Relationship to equilibrium, spontaneous processes. Thermodynamic reference states, state functions, the use of Hess’s law for thermochemical calculations |
| Weeks 3‐4; Ch. 18 | Electrochemistry; electromotive force, cell potentials, half reactions and oxidation reduction processes. Galvanic cells, relationship of standard reference points and standard cells to electrochemical calculations. Electrolysis. Applications |
| Weeks 5‐6; Ch. 13 | Kinetics; Basic rate laws, integrated rate laws. Experimental determination of rate behaviour. Arrhenius behaviour. Introduction to transition states and activation energies. |
| Reading Break |  |
| Weeks 7‐8; Ch. 20, 24 | Catalysis. Introduction to organic nomenclature and basic organic reactions. Inorganic chemistry and the crystal field splitting theory. Colours in chemical systems. |
| Weeks 9‐10; Ch. 21 | Introduction to biological chemistry. |
| Weeks 11‐ 12 | Other applications of chemistry |

### University Policies

* Academic Integrity: Academic dishonesty, which includes plagiarism and cheating, is an extremely serious academic offence and carries penalties varying from a 0 grade on an assignment to expulsion from the University. Definitions, penalties, and procedures for dealing with plagiarism and cheating are set out in Trent University’s Academic Integrity Policy. You have a responsibility to educate yourself – unfamiliarity with the policy is not an excuse. You are strongly encouraged to [visit Trent’s Academic Integrity website to learn more](http://www.trentu.ca/academicintegrity).
* Clickers (Personal Response Systems): As clicker records are used in this course to compute a portion of course grades, the use of a clicker other than your own is an academic offence. In lecture or tutorial, possession of more than one clicker, or that of another student, may be interpreted as intent to commit an academic offense.
* Access to Instruction: It is Trent University's intent to create an inclusive learning environment. If a student has a disability and/or health consideration and feels that he/she may need accommodations to succeed in this course, the student should contact the Student Accessibility Services (Blackburn Hall Room 132, 748-1281, [accessibilityservices@trentu.ca](mailto:accessibilityservices@trentu.ca)) as soon as possible. Complete text can be found under Access to Instruction in the Academic Calendar.

Please see the Trent University academic calendar for University Diary dates, Academic Information and Regulations, and University and departmental degree requirements.

### Department and/or Course Policies: Chemistry Department Policy on Completion of Course Work

* The Department of Chemistry considers that completion of all components of a course is necessary for a student to be given credit in that course. Therefore, it is the policy of the Department that a student must complete, and hand in if applicable, all material associated with each component of the course. This applies equally to work that is handed in or completed too late to earn any marks in the course, in conjunction with the policy of the course instructor on lateness.
* Students who fail to meet this requirement for reasons that would make it reasonable to assign an ”incomplete” mark for the course should consult the instructor well before on which final marks are due for the course in question. In the absence of an incomplete standing being assigned, the student will receive a mark of “0” and an “F” grade in the course.