Faculty of Science Course Syllabus
Department of Chemistry
CHEM 1012/1022
Concepts in Chemistry: Energy and Equilibrium

First Year Chemistry Coordinator – Dr. Angela Crane

Email: chemlect@dal.ca
Phone: 902–494–6143
Office: Chemistry 1052

First Year Chemistry Lecturer - Chem 1012/1022 Section 01

Dr. Josh Bates
May 31- June 1, 2018
Time: 12:35 pm – 2:25 pm
Location: Dunn 117, Sir James Dunn Building

Dr. Marc Whalen
June 4 - June 22, 2018
Time: 12:35 pm – 2:25 pm
Location: MacMechan Auditorium, Killam Library

First Year Chemistry Concept Room

Dr. Josh Bates (June 1-15)
Dr. Rory Chisholm (June 18-22)

Required Materials

Textbook
Concepts in Chemistry:
Energy and Equilibrium (2017–18 Ed.)
Available at the Dalhousie Bookstore ($67.65)
It is STRONGLY RECOMMENDED that you bring your textbook to class with you.
First Year Chemistry Lab Coordinator

Dr. Jennifer MacDonald

Email: chemlab@dal.ca
Phone: 902−494−2440
Office: Chemistry 108

Labs

Location:
Basement of the Chemistry Building
Room 100−108P

Summer 2018 Lab Schedule:
The lab schedule is posted on Brightspace and can be found in the calendar on pages 3 and 10 of the syllabus.

Labs Begin:
Monday, June 4th, 2018

Lab Instructors

Dr. Jennifer MacDonald
Dr. Gianna Aleman

Required Materials: Mandatory for All Labs

Lab Manual
Available from the Dalhousie Bookstore ($17.60)

Hardcover Lab Notebook
Available from the Dalhousie Bookstore (~$6.95)

Safety Glasses
Must be stamped with standards numbers of:
CSA−Z94−3 or ANSI Z87
Available from the Dalhousie Bookstore (~$4.95)

Knee−length Lab Coats (100% cotton)
Available from the Dalhousie Bookstore (~$19.95 – 24.95)
## Important Dates

**Note:** Topic schedule for lectures is tentative. Test, exam, quiz, and due dates/deadlines are fixed.

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
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</thead>
<tbody>
<tr>
<td><strong>Resource Centre Assist.</strong></td>
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<tr>
<td><strong>Concept Room</strong></td>
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<td>4-5 pm</td>
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<tr>
<td><strong>Lectures</strong></td>
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<td></td>
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<td></td>
<td><strong>SSB2: Gases &amp; T14: Equilibrium</strong></td>
<td><strong>T14: Equilibrium</strong></td>
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<tr>
<td><strong>Tests &amp; Quizzes</strong></td>
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<tr>
<td><strong>Labs</strong></td>
<td><strong>June 4</strong></td>
<td><strong>June 5</strong></td>
<td><strong>June 6</strong></td>
<td><strong>June 7</strong></td>
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<td>4-5 pm</td>
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<td>10 am-12 pm</td>
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<td>3-4 pm</td>
<td>3-4 pm</td>
<td>4-5 pm</td>
<td>3-4 pm</td>
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<tr>
<td><strong>Tests &amp; Quizzes</strong></td>
<td>Review Assign due at 11:30pm</td>
<td><strong>Quiz #1</strong> Covers SSB2, T14 and T15</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lect. CAPA due</strong></td>
<td>Labs</td>
<td>Exp. 8 &amp; 9 A/B: 9-10:30 am C:10:30-12 pm</td>
<td>Exp. 10 A/B: 9-10:30 am C:10:30-12 pm</td>
<td>Exp. 11 A/B: 9 am-12 pm</td>
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<tr>
<td><strong>Labs Due</strong></td>
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<td><strong>June 12</strong></td>
<td><strong>June 13</strong></td>
<td><strong>June 14</strong></td>
</tr>
<tr>
<td></td>
<td>Last day to Add/Drop Courses</td>
<td>Last day to Drop w/o “W”</td>
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<tr>
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<td>4-5 pm</td>
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<tr>
<td><strong>Concept Room</strong></td>
<td>3-4 pm</td>
<td>3-4 pm</td>
<td>4-5 pm</td>
<td>3-4 pm</td>
</tr>
<tr>
<td><strong>Tests &amp; Quizzes</strong></td>
<td>Quiz #2 Covers SSB3, T16, T17, T18, T19, T20</td>
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<tr>
<td><strong>Lect. CAPA due</strong></td>
<td>Labs</td>
<td>Exp. 12 &amp; 13 A/B: 9 am-12 pm</td>
<td>Exp. 12 &amp; 13 A/B: 9-10:30 am C:10:30-12 pm</td>
<td>Exp. 14 A/B: 9-10:30 am C:10:30-12 pm</td>
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<tr>
<td><strong>Labs Due</strong></td>
<td><strong>June 16</strong></td>
<td><strong>June 17</strong></td>
<td><strong>June 18</strong></td>
<td><strong>June 19</strong></td>
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<tr>
<td></td>
<td>Last day to Drop w/ “W”</td>
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</tr>
<tr>
<td><strong>Resource Centre Assist.</strong></td>
<td>10 am-12 pm</td>
<td>10 am-12 pm</td>
<td>10 am-12 pm</td>
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</tr>
<tr>
<td><strong>Concept Room</strong></td>
<td>3-4 pm</td>
<td>3-4 pm</td>
<td>4-5 pm</td>
<td>3-4 pm</td>
</tr>
<tr>
<td><strong>Tests &amp; Quizzes</strong></td>
<td>Quiz #3 Covers T21, T22, T23, T24, T25</td>
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</tr>
<tr>
<td><strong>Lect. CAPA due</strong></td>
<td>Labs</td>
<td>Exp. 16 A/B: 9 am-12 pm</td>
<td>Exp. 16 A/B: 9-10:30 am C:10:30-12 pm</td>
<td>No Lab</td>
</tr>
<tr>
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<tr>
<td><strong>Labs Due</strong></td>
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</tr>
</tbody>
</table>
## Course Assessment

### Grading Scheme

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAPA Homework (Top 50% count)</td>
<td>2.5%</td>
</tr>
<tr>
<td>Lect. CAPA Assignments (4 Assignments)</td>
<td>7.5%</td>
</tr>
<tr>
<td>In-class quizzes (Best 2 of 3 count)</td>
<td>5%</td>
</tr>
<tr>
<td>Laboratory</td>
<td>15%</td>
</tr>
<tr>
<td>Test 1 June 8, 2018 9 – 11:30 am</td>
<td>30%</td>
</tr>
<tr>
<td>Test 2 June 15, 2018 9 – 11:30 am</td>
<td>20%</td>
</tr>
<tr>
<td>Final Exam June 22, 2018 9 – 12 pm</td>
<td>40%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>

### Important Notes

1. In order to obtain a passing grade in Chem 1012/1022, you must meet all of the following criteria:
   - Obtain at least a grade of 35/70 on the testing component of the course (i.e., on the combined test and final exam grades).
   - Obtain at least a grade of 7.5/15 on the lab component of the course.
   - Obtain at least a total combined grade of 50/100.
   Students who do not meet these criteria will not receive a passing grade in Chem 1012/1022.

2. If you miss a test/exam, please follow the missed test/exam policy outlined on page 7.

3. Under emergency circumstances that have a serious impact on the delivery of this class, there may be a need to alter the syllabus.

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### Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

- **A+** (90–100)
- **B+** (77–79)
- **C+** (65–69)
- **D** (50–54)
- **A** (85–89)
- **B** (73–76)
- **C** (60–64)
- **F** (<50)
- **A−** (80–84)
- **B−** (70–72)
- **C−** (55–59)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A+</strong></td>
<td>Excellent: Considerable evidence of original thinking; demonstrated outstanding capacity to analyze and synthesize; outstanding grasp of subject matter; evidence of extensive knowledge base.</td>
</tr>
<tr>
<td><strong>A</strong></td>
<td>Good: Evidence of grasp of subject matter, some evidence of critical capacity and analytical ability; reasonable understanding of relevant issues; evidence of familiarity with the literature</td>
</tr>
<tr>
<td><strong>A−</strong></td>
<td>Satisfactory: Evidence of some understanding of the subject matter; ability to develop solutions to simple problems; benefitting from his/her university experience.</td>
</tr>
<tr>
<td><strong>B+</strong></td>
<td>Marginal Pass: Evidence of minimally acceptable familiarity with subject matter, critical and analytical skills (except in programs where a minimum grade of ‘C’ is required).</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>Inadequate: Insufficient evidence of understanding of the subject matter; weakness in critical and analytical skills; limited or irrelevant use of the literature.</td>
</tr>
<tr>
<td><strong>B−</strong></td>
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</table>
Lecture Component

CAPA Homework Problems (2.5%)
For each topic covered in the Concepts in Chemistry textbook, additional homework problems have been posted on CAPA. These questions are ranging in difficulty and are meant to be used as a tool for preparing students for tests and exams. Students are required to complete a minimum of 50% of the homework questions on CAPA throughout the term worth 2.5% of the final grade. All homework to be graded must be completed by 12pm (noon) on Thursday, June 21st, 2018. “Student Declaration of Absence” forms cannot be applied to the course homework, as the homework is an ongoing full-term activity.

CAPA Assignments (7.5%)

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Topic(s)</th>
<th>Due Date (11:30pm)</th>
<th>Grade Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review Assignment</td>
<td>SSB1</td>
<td>Mon., June 4</td>
<td>1.5%</td>
</tr>
<tr>
<td>Pre–Test 1 Assignment</td>
<td>SSB2, T14, T15, T16</td>
<td>Wed., June 6</td>
<td>2%</td>
</tr>
<tr>
<td>Pre–Test 2 Assignment</td>
<td>SSB3, T17, T18, T19, T20</td>
<td>Wed., June 13</td>
<td>2%</td>
</tr>
<tr>
<td>Pre-Final Exam Assignment</td>
<td>T21, T22, T23, T24, T25, T26</td>
<td>Wed., June 20</td>
<td>2%</td>
</tr>
</tbody>
</table>

There are 4 online assignments consisting of test–like questions. The content and weight of each assignment is listed in the table to the left. All assignments are open for completion effective May 7th, 2018.

For help with CAPA questions please visit the Resource Centre or Concept Room. In addition, you may press "Send Feedback" at the bottom of the page for the specific CAPA question to email the First Year Team for assistance.

Note: You will be given three tries at each question to obtain your desired grade for most questions. You will only be given only one try for True/False questions. The deadline for each assignment will be strictly adhered to, NO EXCEPTIONS.

In–class Quizzes (5%)

<table>
<thead>
<tr>
<th>Quiz #</th>
<th>Quiz Date</th>
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<tbody>
<tr>
<td>1</td>
<td>Wed., June 6</td>
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<tr>
<td>2</td>
<td>Wed., June 13</td>
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<tr>
<td>3</td>
<td>Wed., June 20</td>
</tr>
</tbody>
</table>

There are 3 in–class quizzes, based on the material learned in the previous lectures (see calendar on page 3 for topics). Your final grade will be based on the best 2 out of 3 quizzes. In–class quizzes will occur at the beginning of the lecture and last 20 minutes. Each quiz will contain test–like questions. These questions may be multiple choice or free–response. Only those answers submitted on the bubble page will be graded.

Please be on–time to class on quiz days. There are no make–up quizzes or extra time given for students who arrive late for the quiz. “Student Declaration of Absence” forms cannot be applied to a quiz, as 1 quiz is already being dropped.

Allowed Materials for In–class Quizzes:

- Dark Pen (blue or black ink) or dark pencil
- Non–programmable calculator: programmable calculators or any other electronic devices are not permitted during quizzes, tests, or exam

All constants and equations, and a periodic table will be provided to you when writing each quiz. NO additional resources are permitted in the in–class quizzes.
Tests and Exams (30% Tests, 40% Exam)

The Chem 1012/1022 Midterm Tests will occur on:

**Test 1:**
Friday, June 8th, 2018, 9:00 – 11:30 am (covers Self-Study B2 and Topics 14-16)

**Test 2:**
Friday, June 15th, 2018, 9:00 – 11:30 am (covers Self-Study B3 and Topics 17-20)

The tests will take place in LSC 240 and LSC 236. Please check the Chem 1012/1022 Lecture Brightspace in the “Grades” section for your location assignment.

The Chem 1012/1022 Final Exam will be:
Friday, June 22th, 2018, 9:00 – 12 am (covers Self-Studies B2/B3 and Topics 14 – 26)

The format of the TESTS will be:
9:00 – 10:00 am: Individual Test (**Mandatory**)
10:30 − 11:30 am: Group Test (**Optional, but strongly suggested**)

For those students choosing to complete a group test, your test grade will be calculated based on both the individual and group tests. The weighting of your overall test grade will be 90% individual and 10% group provided that the individual test grade is greater than 0% AND the group test grade is better than the individual test grade. Otherwise the individual test grade will count for 100% of your test grade.

Writing the group test can only **IMPROVE** upon your individual test grade. Writing a group test has many advantages besides a potential increase in grade, such as discussing chemistry with your peers, learning from your mistakes immediately after writing a test, clearing up misconceptions you may have had, and an overall reduction in test anxiety. The group test is optional but students are strongly encouraged to participate in this activity.

Group numbers will be assigned to all students: See the "Grades" section on Brightspace.

The format of the FINAL EXAM will be an **individual assessment only**.

All tests and exams consist of multiple choice or free–response questions. **Only those answers submitted on the bubble page will be graded.**

Allowed Materials for Tests and Exams:
- **Dark Pen (blue or black ink) or dark pencil**
- **Non–programmable calculator**: programmable calculators or any other electronic devices are not permitted during quizzes, tests, or exam

All constants and equations, and a periodic table will be provided to you when writing each test/exam. A copy of this Data sheet will be available on Brightspace at the beginning of term. **NO additional resources are permitted in the midterm tests and exam.**
Test/Exam Conflicts: If you have a conflict with a test or final exam, you must contact the First Year Chemistry Coordinator (chemlect@dal.ca) before the deadlines listed below. After each deadline, you will be notified of your alternative test or exam writing time and location. Conflicts include, but are not limited to, direct overlap of the chemistry test/exam with another test/exam or another class you are registered for. All internal Dalhousie conflicts are checked. External conflicts will require supporting documentation. Students are to make every effort to resolve all other conflicts, such as those with work and volunteer schedules. The deadlines for submission of conflicts for each test and exam are listed below:

Test 1 conflict deadline:
Email conflicts to chemlect@dal.ca by Tuesday, June 5th, 2018 at 11:30 pm.

Test 2 conflict deadline:
Email conflicts to chemlect@dal.ca by Tuesday, June 12th, 2018 at 11:30 pm.

Final Exam conflict deadline:
Email conflicts to chemlect@dal.ca by Tuesday, June 19th, 2018 at 11:30 pm.

Missed Tests: If you miss a test, you must contact the First Year Chemistry Coordinator (chemlect@dal.ca) within 72 hours of the missed test and submit a completed “Student Declaration of Absence” form, which can found on Brightspace. Once this form is received, the weight of the test that was missed will be 10% and transferred to the final exam. If both tests are missed, and two “Student Declaration of Absence” forms are submitted, a 70% final exam will result, as all testing component weight will shift to the final exam.

Missed Final Exam: If you miss a final exam, you must contact the First Year Chemistry Coordinator (chemlect@dal.ca) immediately. Appropriate documents (such as a medical certificate) must be submitted to the First Year Chemistry Coordinator, so that you will be eligible for an exam accommodation. “Student Declaration of Absence” forms cannot be used during the exam period. Medical documents/certificates must indicate the dates and duration of the illness, and when possible should describe the impact it had on the student’s ability to fulfill academic requirements, and should include any other information the physician considers relevant and appropriate. Medical documents/certificates must be received within 7 days of the missed exam, otherwise no accommodation will be made.

Academic Integrity: All in-class quizzes, individual tests, and final examinations are to be completed by each student independently. In cases of cheating or collaboration on these assessments, aiding another student in committing an offense is also punishable.

Submitted assessments suspected of any academic integrity (AI) offense will be investigated, with penalties for confirmed offenses typically being a deduction of 5% from the final course grade for in-class quizzes or a deduction of 15% from the final course grade for test. AI offenses on a final exam are extremely serious and could result in course failure.

While students must complete their own work individually, students are reminded that there is help available in The Concept Room and Chemistry Resource Centre.
Laboratory Component

The lab instructors are responsible for making all decisions concerning the running and grading of the labs. Queries concerning the laboratories should be directed to them by emailing chemlab@dal.ca. You must pass the lab component of the course (7.5/15) in order to pass Chem 1012/1022.

Student Safety in the Undergraduate Laboratories

Chemicals and lab equipment can pose serious hazards if they are not treated with an appropriate amount of caution. As a chemistry student, part of your training involves understanding the hazards that are present within a chemistry lab and learning the measures that must be taken in order to maximize your safety and the safety of your peers. As part of your lab assignment, you are REQUIRED to complete a Chemistry Safety Module. Students who do not successfully complete this requirement will not be allowed to perform experiments in any Dalhousie undergraduate chemistry lab. Successful completion of the Safety Module includes reading the General Safety Statement in your lab manual, obtaining a perfect mark (i.e. 100%) on the Safety Module (located in CAPA on the First Year Chemistry Labs−2018 Summer site), and completing the lab map during your first time in lab. After completion of these requirements you should feel comfortable working in a chemistry lab and have the tools you need to promote a safe lab environment.

The Chemistry Safety Module must be completed by 11:30 pm June 3, 2018. Students who completed the module in May 2018 do not need to repeat the module.

Laboratory Format, Expectations, and Policies

Experimental work must be completed during the scheduled time for your particular section. Attendance is mandatory. Before leaving your first lab period, make sure that you understand your Lab Schedule (posted on Brightspace).

Before Your Experiment

You are expected to read the experiment, prepare your hard−covered notebook, and complete the pre−lab questions on CAPA. There are optional practice questions in your lab manual.

A hard−covered notebook is required for this course. The notebook is a permanent record of your work; therefore, all entries must be written in ink and only on the right hand page. Prior to each lab period, your notebook must be prepared with:

- Date
- Title of Experiment
- Data Tables and Observations from Raw Data Sheet. If the experiment does not have a Raw Data Sheet, please use the Grade Sheet in your lab manual as a guide to prepare your lab notebook.
During Your Experiment
Each laboratory period begins with a lab lecture and/or video. New techniques are demonstrated and safety considerations discussed. During this time, a teaching assistant will check and initial your notebook for the above entries and pick up laboratory reports that are due that day.

During the experiment, **all data must be recorded in ink** in your notebook. Erasers or liquid paper are not permitted. Simply cross out errors, which are part of the scientific process.

After completing the experiment, you must have the data in your notebook initialed again by the instructor or teaching assistant. If the experiment requires the submission of a raw data sheet your instructor or teaching assistant will initial this sheet at the same time as your data in your notebook. **Only the initialed data from the raw data sheet may be used to complete your post–lab report.** Ensure your glassware and lab bench are left clean and neat.

After Your Experiment
There will be a report (the grade sheet found in the lab manual). Refer to the tables on page 12–13 of the syllabus for more information about point values and due dates. Written reports **must be completed in ink.**

Laboratory Assessment
The laboratory portion of this course is worth 15 percent of the final grade. See the table on page 12 of the syllabus for the point value of each experiment. All experiments have a pre–lab component as well as a report. A completed lab consists of:

- Preparation of the notebook prior to the laboratory period;
- Completion of experimental work, recording data, and having notebook initialed;
- Submitting in appropriate pre–lab assignments, raw data sheets, and post–lab assignments. All reports must be your individual work.

Failure to complete any **one** of the above will result in loss of the value of the experiment.

**CAPA Pre–Lab Assignments:** The online pre–lab assignments have been developed to help you prepare for the lab. CAPA pre–labs are due 5 minutes before your scheduled lab. **The deadline for each assignment will be strictly adhered to, NO EXCEPTIONS.** We encourage you to start early to ensure you are able to get help with the questions that cause you difficulty. We have done our best to ensure that the questions are free from errors. However, if you feel there is an error you can apply for a grade adjustment by selecting the “Send Feedback” at the bottom of the page for the specific CAPA question. Make sure you explain why you feel your grade should be adjusted before sending your message.

**Preparedness:** You are expected to come to lab prepared. If you are unprepared (i.e. did not attempt to complete CAPA pre–lab questions or did not properly prepare your lab notebook) it will be recorded. **If you are marked unprepared three or more times you will receive a 0.5 mark reduction in your overall lab grade at the end of the term.**

**Late work:** Will not be accepted after the posted deadlines. **If you have more than one late submission you will receive a 0.5 mark reduction in your overall lab grade, per late submission, at the end of the term. One late submission will be allowed without penalty.**
Laboratory Grading Scheme

<table>
<thead>
<tr>
<th>Lab</th>
<th>Exp. 8</th>
<th>Exp. 9</th>
<th>Exp. 10</th>
<th>Exp. 11</th>
<th>Exp. 12</th>
<th>Exp. 13</th>
<th>Exp. 14</th>
<th>Exp. 15</th>
<th>Exp. 16</th>
<th>Total Points</th>
<th>Total (/15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>18</td>
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<td>14</td>
<td>13</td>
<td>7</td>
<td>6</td>
<td>9</td>
<td>7</td>
<td>8+2(prelab)</td>
<td>86</td>
<td>13</td>
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</table>

You must pass the lab component of the course (7.5/15) in order to pass Chem 1012/1022.

Laboratory Schedule

<table>
<thead>
<tr>
<th>Sect.</th>
<th>Exp. 8 &amp; 9</th>
<th>Exp. 10</th>
<th>Exp. 11</th>
<th>Exp. 12 &amp; 13</th>
<th>Exp. 14</th>
<th>Exp. 15</th>
<th>Exp. 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>B01 A/B</td>
<td>Mon., June 4 9-10:30 am</td>
<td>Tues., June 5 9-10:30 am</td>
<td>Wed., June 6 9 am-12 pm</td>
<td>Mon., June 11 9 am-12 pm</td>
<td>Wed., June 13 9-10:30 am</td>
<td>Thurs., June 14 9-10:30 am</td>
<td>Mon., June 18 9 am-12 pm</td>
</tr>
<tr>
<td>B01 C</td>
<td>Mon., June 4 10:30 am-12 pm</td>
<td>Tues., June 5 10:30 am-12 pm</td>
<td>Thurs., June 7 9 am-12 pm</td>
<td>Tues., June 12 9 am-12 pm</td>
<td>Wed., June 13 10:30 am-12 pm</td>
<td>Thurs., June 14 10:30 am-12 pm</td>
<td>Tues., June 19 9 am-12 pm</td>
</tr>
</tbody>
</table>

Pre−Lab and Post−Lab Due Dates

This table shows ALL pre−lab and post−lab deadlines. Find YOUR lab section and highlight the row to find YOUR deadline schedule.

<table>
<thead>
<tr>
<th>Sect.</th>
<th>Lab</th>
<th>Exp. 8 &amp; 9</th>
<th>Exp. 10</th>
<th>Exp. 11</th>
<th>Exp. 12 &amp; 13</th>
<th>Exp. 14</th>
<th>Exp. 15</th>
<th>Exp. 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>B01 A/B</td>
<td>Pre</td>
<td>June 4, 8:55 am</td>
<td>June 5, 9:00 am</td>
<td>June 6, 8:55 am</td>
<td>June 11, 8:55 am</td>
<td>June 13, 8:55 am</td>
<td>June 14, 8:55 am</td>
<td>June 18, 8:55 am</td>
</tr>
<tr>
<td>Post</td>
<td></td>
<td>June 4, 9:00 am</td>
<td>June 6, 9:00 am</td>
<td>June 11, 9:00 am</td>
<td>June 14, 9:00 am</td>
<td>June 18, 9:00 am</td>
<td>June 19, 12:00 pm</td>
<td></td>
</tr>
<tr>
<td>B01 C</td>
<td>Pre</td>
<td>June 4, 10:25 am</td>
<td>June 5, 10:30 am</td>
<td>June 7, 8:55 am</td>
<td>June 12, 8:55 am</td>
<td>June 13, 10:25 am</td>
<td>June 14, 10:25 am</td>
<td>June 19, 8:55 am</td>
</tr>
<tr>
<td>Post</td>
<td></td>
<td>June 5, 10:25 am</td>
<td>June 7, 9:00 am</td>
<td>June 12, 9:00 am</td>
<td>June 14, 10:30 am</td>
<td>June 19, 9:00 am</td>
<td>June 19, 12:00 pm</td>
<td></td>
</tr>
</tbody>
</table>

The Chemistry Safety Module must be completed by 11:30 pm June 3, 2018.

Missed Labs and Make−up Experiments

If you miss a lab, you must email your lab instructor (chemlab@dal.ca) within 24 hours of the missed lab to schedule a make−up experiment. Failure to do so will result in a grade of 0 for the missed lab.

Your email must include:

- Subject line:  
  1. course number  
  2. lab section (e.g. C)
- Body of your message:  
  1. your name:  
  2. student ID (B00#):  
  3. course number and lab section:  
  4. experiment(s) missed:  
  5. your availability (please refer to the last opportunity for make−up lab table below on page 14 of the syllabus):

This process filters your message to the correct instructor automatically (based on section in the subject line) which allows us to help you faster!
Final Due Dates for Make-ups and Late Work Submissions:

<table>
<thead>
<tr>
<th>Exp.</th>
<th>Last Opportunity for Make-up Lab</th>
<th>Late Work Submission Deadline*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group A/B</td>
<td>ALL Groups</td>
</tr>
<tr>
<td>8 &amp; 9</td>
<td>June 5</td>
<td>June 6 before 9:00am</td>
</tr>
<tr>
<td>10</td>
<td>June 6</td>
<td>June 11 before 9:00am</td>
</tr>
<tr>
<td>11</td>
<td>June 7</td>
<td>June 13 before 9:00am</td>
</tr>
<tr>
<td>12 &amp; 13</td>
<td>June 12</td>
<td>June 14 before 9:00am</td>
</tr>
<tr>
<td>14</td>
<td>June 14</td>
<td>June 18 before 9:00am</td>
</tr>
<tr>
<td>15</td>
<td>June 18</td>
<td>June 19 before 9:00am</td>
</tr>
<tr>
<td>16</td>
<td>June 19</td>
<td>In-lab submission only</td>
</tr>
</tbody>
</table>

*NOTE: Late work may only be submitted electronically via Brightspace.

1. No student will be admitted to the lab for a make-up experiment without prior instructor permission.
2. No student will be allowed to do a make-up after posted deadlines (to the left).
3. No report will be accepted after the late submission deadlines posted in the table on page 11.

IMPORTANT NOTES:

Pre-lab deadlines remain as scheduled in the syllabus regardless of make-up arrangements.

ALL make-up and late post-lab submissions must be submitted electronically via Brightspace (details for submitting electronic assignments outlined on the Chem 1012/1022 Lab Brightspace site).

The lab instructor will then email you a letter of permission to do a make-up experiment at an agreed-upon time and assign a due date for your post-lab report. When you arrive to your make-up experiment you must present yourself to the instructor to be assigned a temporary locker space.

General Lab Questions/Inquiries

Direct all lab related inquiries to chemlab@dal.ca. To ensure you receive assistance in a timely manner you must include the following information in your message:

- Subject line
  1. course number
  2. lab section (e.g. C)

- Body of your message
  1. your name:
  2. student ID (B00#):
  3. course number and lab section:
  4. your question/inquiry:

This process filters your message to the correct instructor automatically (based on section number in the subject line) which allows us to help you faster!
Academic Integrity

In some experiments, you may be expected to work with a partner in the lab. In such cases, you will share a common set of experimental data and observations. Whether the lab was performed individually or in partners, any subsequent work submitted for grading must be completed individually. This includes, but not limited to, data analysis (such as calculations and graphs) and discussions (such as answers to questions and conclusions).

Submitted work suspected of any academic integrity (AI) offense (including copying or unauthorized collaboration) will be investigated, with penalties for confirmed offenses are typically a 0 on the lab report and a 5% deduction from the final course grade.

While students must complete their own work individually, students are reminded that there is help available in The Concept Room and Chemistry Resource Centre.

Lab Exemptions

Lab exemptions will be granted to those who have already completed the course (with a letter grade of A–F), have a grade of 40% or higher on the lecture component, and have a lab grade of 10/15 or better on the lab component of the course.

Lab grades for lab exemption carry forward if the student repeats the course within a 24 month period of the original start date. For example, if a student enrolls in Chem 1012/1022 in June 2018 and completes the course with a grade of F, has 45% (38/85) on the lecture component, and a lab score greater than 10/15 the student would qualify for lab exemption in the following terms: Winter 2019, Summer 2019, and Winter 2020. After the 24 month window has passed the student will be required to retake the lab component when repeating the course.

You must contact the first year lab coordinator (chemlab@dal.ca) in order to apply for a lab exemption. Labs exemptions will not automatically be granted.
Student Resources

Brightspace Lab and Lecture Sites
We post a number of resources on the Brightspace Lab and Lecture sites. We strongly recommend that you review these sites. The resources on these sites are intended to support your learning as the term progresses. Some of these resources include pre-lab videos, online video tutorials for lab reports and material, schedules, contact information, and much more! We also recommend that you refer to the sites on a regular basis. Important information such as grades and test locations will be posted as they become available.

The Concept Room and Chemistry Resource Centre
The Concept Room is staffed by members of the First Year Chemistry team who are available to answer lecture content and CAPA assignment questions. The Resource Centre is staffed by advanced undergraduate or graduate student TAs (Resource Centre Assistants) who can assist you with CAPA assignments, pre-lab and post-lab questions. Please refer to page 3 for the Concept Room and Resource Centre schedule.

The Concept Room: Lecture Support

Dr. Josh Bates (June 1-15) Dr. Rory Chisholm (June 18-22)
Opens: Friday, June 1st, 2018 Location: Basement of the Chemistry Building

Course Description:
Credit Hours: 3
The principles of thermodynamics and kinetics are used to explain chemical reactivity and the principles of organic chemistry are used to develop an understanding of organic synthesis. Special topics include electrochemistry, spectroscopy, chirality, polymers, and the chemistry of living systems to illustrate the relevance of chemistry in everyday life.

PREREQUISITE: CHEM 1011.03, CHEM 1021.03 or equivalent
COORDINATORS: A. Crane, J. MacDonald
FORMAT: Lecture| Lab
LECTURE HOURS PER WEEK: 3
LAB HOURS PER WEEK: 3
EXCLUSIONS: Credit will be given for only one of the following combinations: CHEM 1011.03/1012.03 or CHEM 1021.03/1022.03
### Course Objectives:

Our primary objective for First Year Chemistry is to offer you a comprehensive and relevant course on the fundamental concepts in chemistry.

We offer a number of resources to support your studies including a customized textbook that will be used during the lectures, online video tutorials and extra help from a first year team member in the Chemistry *Concept* Room.

### Course Content and Learning Outcomes

#### Self Study B1: Foundations in Chemistry

- Vocabulary of Chemistry
- Naming Inorganic Compounds
- Significant Figures
- Light
- Lewis Structures
- VSEPR Theory
- pH of Weak Acids and Weak Bases
- Henderson-Hasselbalch Equation

#### Self Study B2: Gases

- The Mercury Barometer and Pressure
- The Ideal Gas Law
- Density of Gases
- Dalton’s Law of Partial Pressures
- Real Gases
- Compare and contrast ideal and real gas behavior
- Calculate quantities using the ideal gas law for simple systems, changes in conditions, and the density of gases
- Calculate quantities using Dalton’s Law of partial pressures for mixtures of gases and gas phase reactions

#### Self Study B3: Reduction-Oxidation (Redox) Reactions

- The Fundamentals of Redox Reactions
- Assigning Oxidation Numbers
- Balancing Redox Reactions in Acidic Solution
- Balancing Redox Reactions in Basic Solution
- Assign oxidation numbers to elements, molecules and molecular ions
- Balance redox reactions in acidic and basic solutions
- Identify oxidation and reduction processes

#### Topic 14: Chemical Equilibria

- The Equilibrium and Reaction Quotient Expressions
- The Equilibrium Constant
- Quantitative Data from the Equilibrium Expression
- Relationship between the Equilibrium Constant and Gibbs Energy
- Le Chatelier’s Principle Gibbs Energy Change under Non-Standard Conditions
- Apply the concepts of chemical equilibria to gas phase reactions
- Relate the reaction quotient to the equilibrium constant to determine how the reaction will establish equilibrium
- Calculate equilibrium quantities using initial conditions and the equilibrium constant
- Calculate Gibbs Energy under standard and nonstandard conditions
- Apply Le Chatelier’s Principle to predict the effect of perturbing an equilibrium
### Topic 15: First Law of Thermodynamics
- Kinetic Energy and Potential Energy
- System and Surroundings
- Specific Heat Capacity and Heat Capacity and Calorimetry
- Heat and Temperature
- Work and Volume
- First Law of Thermodynamics: Heat and Work
- State Functions
- Enthalpy
- Heating, Cooling and Enthalpies of Phase Changes
- Explain the transfer of energy from a chemical perspective
- Use heat capacity and specific heat capacity to explain how heat is transferred between the system and surroundings
- Apply heat and work calculations to calculating the change in internal energy for a system
- Distinguish between a reversible and an irreversible process for work
- Describe a state function
- Describe the relationship between enthalpy, heat and the reaction conditions (constant volume or constant pressure)
- Distinguish between the different types of phase changes and relate the enthalpy changes to these processes
- Apply heat calculations to calorimetry to explain the experimental determination of heat transfer

### Topic 16: Standard Reaction Enthalpies and Hess’s Law
- Standard State and Standard Enthalpy Change
- Thermochemical Equations and Enthalpy Diagrams
- Hess’s Law
- Standard Enthalpy of Formation
- Bond Enthalpies and Enthalpy of Reaction
- Enthalpy Changes for Biological Processes
- Calculate reaction enthalpies and enthalpy changes using Hess’s Law
- Calculate reaction enthalpies using standard enthalpies of formation
- Estimate reaction enthalpies using bond enthalpies
- Relate reaction enthalpies to the corresponding balanced chemical equations, reactant/product quantities and standard types of reactions (including formation, combustion and phase changes)

### Topic 17: Entropy: Second and Third Laws of Thermodynamics
- Entropy
- Predicting Entropy Changes
- Second Law of Thermodynamics
- Third Law of Thermodynamics and $\Delta S^\circ_{\text{rx}}$
- Define spontaneous processes and relate them to the concept of Entropy
- Distinguish the entropy of the universe from the entropy of the system using the second law of thermodynamics
- Calculate entropy changes in physical and chemical processes using the third law of thermodynamics
- Predict the sign of entropy changes for physical and chemical processes

### Topic 18: Gibbs Energy
- Gibbs Energy
- Gibbs Energy and Temperature
- Calculating $\Delta G$
- Relate Gibbs Energy to the Entropy of the Universe
- Assess the Gibbs Energy Dependence on Enthalpy, Entropy and temperature.
- Relate the properties of state functions to Gibbs Energy
- Relate Gibbs Energy to work
<table>
<thead>
<tr>
<th>Topic 19: Phase Equilibria and Partitioning of Compounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Liquid-Gas Phase Equilibria</td>
</tr>
<tr>
<td>• Phase Diagrams</td>
</tr>
<tr>
<td>• Liquid-Gas Two Component Mixtures</td>
</tr>
<tr>
<td>• Multiple Component Mixtures</td>
</tr>
<tr>
<td>• Partitioning of Compounds</td>
</tr>
<tr>
<td>• Chromatography</td>
</tr>
<tr>
<td>• Combine Gibbs energy calculations and gas phase equilibrium to describe liquid-gas phase equilibria for one component systems</td>
</tr>
<tr>
<td>• Use phase diagrams to explain the temperature and pressure dependence on phases</td>
</tr>
<tr>
<td>• Use Raoult's Law to describe the liquid-gas phase equilibria for two component systems</td>
</tr>
<tr>
<td>• Apply the concept of polarity and intermolecular interactions to partitioning of a substance between two different solvents/substrates ($K_{ow}$ and chromatography)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topic 20: Electrochemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Electrochemical Cells</td>
</tr>
<tr>
<td>• Standard Half-Cell Potentials and Standard Cell Potentials</td>
</tr>
<tr>
<td>• Calculations of Standard Cell Potentials</td>
</tr>
<tr>
<td>• Cell Potentials, Gibbs Energies and Spontaneity</td>
</tr>
<tr>
<td>• Cell Potentials under Non-Standard Conditions</td>
</tr>
<tr>
<td>• Construct a simple electrochemical cell</td>
</tr>
<tr>
<td>• Calculate cell potentials under standard and non standard conditions for an electrochemical cell</td>
</tr>
<tr>
<td>• Calculate Gibbs energy for an electrochemical cell under standard and non-standard conditions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topic 21: Alkanes, Cycloalkanes and Functional Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Saturated Hydrocarbons</td>
</tr>
<tr>
<td>• Cycloalkanes</td>
</tr>
<tr>
<td>• Functional Groups in Organic Chemistry</td>
</tr>
<tr>
<td>• Rules for Systematic Naming of Hydrocarbon Compounds</td>
</tr>
<tr>
<td>• Alkenes, Alkynes and Aromatics</td>
</tr>
<tr>
<td>• Alcohols and Ethers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>• Aldehydes and Ketones</td>
</tr>
<tr>
<td>• Carboxylic Acids and Esters</td>
</tr>
<tr>
<td>• Amines and Amides</td>
</tr>
<tr>
<td>• Chirality</td>
</tr>
<tr>
<td>• Apply systematic naming of organic compounds (name to structure and structure to name) with one functional group</td>
</tr>
<tr>
<td>• Distinguish between a functional group and a substituent</td>
</tr>
<tr>
<td>• Identify chiral centers (carbon only)</td>
</tr>
<tr>
<td>• Distinguish between chiral and achiral compounds</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topic 22: Spectroscopy</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ultraviolet and Visible (UV/Vis) Spectroscopy</td>
</tr>
<tr>
<td>• Infrared Spectroscopy (IR)</td>
</tr>
<tr>
<td>• Nuclear Magnetic Resonance (NMR) Spectroscopy</td>
</tr>
<tr>
<td>• Chemical Equivalence and Non-Equivalence</td>
</tr>
<tr>
<td>• Calculate quantities using Beer's Law</td>
</tr>
<tr>
<td>• Interpret infrared spectra for simple organic molecules</td>
</tr>
<tr>
<td>• Interpret $^{13}$C NMR spectra for simple organic molecules</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topic 23: Introduction to Chemical Reactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reactions of Organic Compounds</td>
</tr>
<tr>
<td>• $S_N2$ Substitution Reactions</td>
</tr>
<tr>
<td>• Addition Reactions of Lithium Reagents</td>
</tr>
<tr>
<td>• Diels-Alder Reactions</td>
</tr>
<tr>
<td>• Predict products and draw curly arrow mechanisms for SN2, Diels Alder and Alkyl Addition reactions</td>
</tr>
</tbody>
</table>
### Topic 24: Rates of Chemical Reactions
- Average Rate of Reaction
- Instantaneous Rate of Reaction
- Rate Law
- Integrated Rate Laws for First Order Reactions
- Half-Life for First Order Reactions
- Integrated Rate Law for Second Order Reactions
- Radioactive Decay
- Calculate quantities associated with the average rate of reaction
- Determine the rate law for a reaction using experimental data
- Calculate quantities associated with the first and second order integrated rate laws
- Apply the concepts of radioactive decay to first order processes

### Topic 25: Reaction Mechanisms and Catalysis
- Mechanisms of Reactions
- Temperature and the Rate of Reaction
- Catalysis
- Sketch a simple reaction coordinate diagram
- Calculate quantities associated with the temperature dependence of rate constants (Arrhenius equation)
- Describe the effect of a catalyst on a reaction coordinate diagram and activation energy
- Differentiate between homogeneous and heterogeneous catalysis

### Topic 26: Synthetic Polymers
- Monomers and Polymers
- Size of Polymers
- Physical Properties of Polymers
- Addition Polymerization (Radical) and Step Growth Polymerization (Condensation)
- Identify the monomer(s) used to make a polymer
- Draw the polymer made from a given monomer(s)

### Topic 27: Proteins and Peptides; Biopolymers of Amino Acids
- Amino Acids
- Peptides and Proteins
- Protein Structure
- Enzyme Catalysis
University Policies and Statements

This course is governed by the academic rules and regulations set forth in the University Calendar and by Senate.

Accessibility

The Advising and Access Services Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students who request accommodation as a result of a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (Canada and Nova Scotia).

Information: https://www.dal.ca/campus_life/academic-support/accessibility.html

Academic Integrity

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity.

Information: https://www.dal.ca/dept/university_secretariat/academic-integrity.html

Student Code of Conduct

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner—perhaps through a restorative justice process. If an informal resolution can’t be reached, or would be inappropriate, procedures exist for formal dispute resolution.


Diversity and Inclusion – Culture of Respect

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness.

Information: http://www.dal.ca/cultureofrespect.html

Recognition of Mi’kmaq Territory

Dalhousie University would like to acknowledge that the University is on Traditional Mi’kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit or e-mail the Indigenous Student Centre (1321 Edward St) (elders@dal.ca).

Information: https://www.dal.ca/campus_life/communities/indigenous.html

Important Dates in the Academic Year (including add/drop dates)

https://www.dal.ca/academics/important_dates.html

University Grading Practices
Student Resources and Support

The following campus services are available to help students develop skills in library research, scientific writing, and effective study habits. The services are available to all Dalhousie students and, unless noted otherwise, are free.

Advising

General Advising: https://www.dal.ca/campus_life/academic-support/advising.html
Science Program Advisors: https://www.dal.ca/faculty/science/current-students/academic-advising.html
Indigenous Student Centre: https://www.dal.ca/campus_life/communities/indigenous.html
Black Advising Centre: https://www.dal.ca/campus_life/communities/black-student-advising.html
International Centre: https://www.dal.ca/campus_life/international-centre/current-students.html

Academic Supports

Library: https://libraries.dal.ca/
Writing Centre: https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html
Studying for Success: https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html
Copyright Office: https://libraries.dal.ca/services/copyright-office.html
Fair Dealing Guidelines: https://libraries.dal.ca/services/copyright-office/fair-dealing.html

Other Supports and Services

Student Health & Wellness Centre: https://www.dal.ca/campus_life/health-and-wellness/services-support/student-health-and-wellness.html
Student Advocacy: https://dsu.ca/dsas

Safety

Biosafety: https://www.dal.ca/dept/safety/programs-services/biosafety.html
Chemical Safety: https://www.dal.ca/dept/safety/programs-services/chemical-safety.html
Radiation Safety: https://www.dal.ca/dept/safety/programs-services/radiation-safety.html

Scent-Free Program

https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html