

Faculty of Science Course Syllabus
Department of Chemistry**CHEM 1011/1021 - Concepts in Chemistry: Structure and Reactivity**

Welcome to Chemistry 1011/1021! We have created a comprehensive course syllabus to address any questions you may have throughout the term. This syllabus serves as a guide and a contract between students and instructors, setting clear expectations of the course and helping you prepare for the semester. Please note that the policies in this syllabus are final and non-negotiable.

The teaching team is proudly here to facilitate your learning. We acknowledge that this summer session of the course is fast paced and may present an intense learning experience (for both students and teaching team). While difficult, it is an opportunity to develop your independent time management and work ethic skills. Please seek support as needed! We are here to support you in this course.

Use the table of contents (with links) below to navigate the syllabus and review important dates and policies. We hope you have an enjoyable and productive semester in First Year Chemistry!

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Land Acknowledgement

Dalhousie University operates in the unceded territories of the Mi'kmaw, Wolastoqey, and Peskotomuhkati Peoples. These sovereign nations hold inherent rights as the original peoples of these lands, and we each carry collective obligations under the Peace and Friendship Treaties. Section 35 of the Constitution Act, 1982 recognizes and affirms Aboriginal and Treaty rights in Canada.

African Nova Scotian Acknowledgement

We recognize that African Nova Scotians are a distinct people whose histories, legacies and contributions have enriched that part of Mi'kma'ki known as Nova Scotia for over 400 years.

Section 1: General Course Information

Who to Contact?

If you have questions about Chem 1011/1021 please do not hesitate to contact one of the First Year Chemistry Coordinators. The best way to contact the First Year Chemistry Coordinators is by **email**. When emailing a course coordinator, please use your **Dalhousie email account** for all course correspondence. Please allow up to **3 business days** for a response and note that emails sent in the evening or on weekends may not be seen until the next business day.

For inquiries about the **Laboratory** portion of the course, please contact:



Dr. Jennifer MacDonald
(pronouns: she/her)
First Year Chemistry Lab Coordinator

Email: chemlab@dal.ca

For **all other inquiries** regarding the course, please contact:



Dr. Angela Crane-Garnier
(pronouns: she/her)
First Year Chemistry Course Coordinator

Email: chemlect@dal.ca

Please note, chemistry content related questions should be directed to the assortment of instructors, professors and teaching assistants (TAs) available to meet with students in the *Concept* Room and Resource Centre, not to the coordinator email accounts. The main reason for this is chemistry content questions are not easily answered via email, and students will likely get a much faster response in the *Concept* Room or Resource Centre. However, don't worry, we have plenty of staff to help students throughout the course!

Mode of Delivery

This course will be held entirely in-person on the Studley Campus of Dalhousie University in Halifax, Nova Scotia, Canada. All times listed in this syllabus are therefore based on the Atlantic time zone.

Important Academic DatesSummer semester A1 (May 11-June 2, 2026)

Monday, May 11, 2026

First day of classes for CHEM1011/1021

Thursday, May 14, 2026

Last day to Add/Drop CHEM1011/1021

Monday, May 18, 2026

Victoria Day: University Closed

Tuesday, May 19, 2026

Last day to Drop CHEM1011/1021 without a "W"

Tuesday, May 26, 2026

Last day to Drop CHEM1011/1021 with a "W"

Tuesday, June 2, 2026

Last day of classes for CHEM1011/1021

Summer semester A2 (June 8-29, 2026)

Monday, June 8, 2026

First day of classes for CHEM1012/1022

Thursday, June 11, 2026

Last day to Add/Drop CHEM1012/1022

Monday, June 15, 2026

Last day to Drop CHEM1012/1022 without a "W"

Monday, June 22, 2026

Last day to Drop CHEM1012/1022 with a "W"

Monday, June 29, 2026

Last day of classes for CHEM1012/1022

Chemistry 1011/1021 Grading Scheme

To calculate a final numerical grade for Chemistry 1011/1021 the following grading scheme will be followed. A detailed breakdown of how grades are distributed for each course activity can be found in the individual section for each component.

Lecture Component:

Experience Points (Homework and Assignments)	10%
Mastery Points (Three Mastery Exams)	60%

*Laboratory Component:*Lab Orientation and Safety

Lab Map & Safety Module	1%
WHMIS Course Module	3%
Lab Station Clean-Up	1%

Lab Work

Pre-Lab Assignments	5%
Post-Lab Reports	15%
Participation: Data Collection/Raw Data Submission	3%
Time Management & Preparedness	2%

Total: 100%

In order to obtain a passing grade in Chem 1011/1021, you must meet ALL of the following criteria:

- Obtain at least a grade of 30/60 on the “Mastery Points” portion of the course.
- Obtain at least a grade of 15.00/30 on the “Laboratory Component” of the course with 12.50/25 from “Lab Work.”
- Obtain at least a total combined grade of 50/100.

No additional assessments (extra credit assignments or supplementary exam retakes) will be given. Final grades will be calculated based on the assessments laid out in this syllabus only.

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

Dalhousie Common Grading Scheme

The final grade posted to your transcript will be determined based on the numerical grade calculated by the Chemistry 1011/1021 Grading Scheme and converted to a letter grade based on the Dalhousie Common Grading Scheme seen below. Note the expectations of students in each grade category as is outlined in the definition of each letter grade category.

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

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

Grade	Definition
A+, A, A–	Excellent: Considerable evidence of original thinking; demonstrated outstanding capacity to analyze and synthesize; outstanding grasp of subject matter; evidence of extensive knowledge base.
B+, B, B–	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
C+, C, C–	Satisfactory: Evidence of some understanding of the subject matter; ability to develop solutions to simple problems; benefitting from their university experience.
D	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).
F	Inadequate: Insufficient evidence of understanding of the subject matter; weakness in critical and analytical skills; limited or irrelevant use of the literature.

For more information about Dalhousie University's Grading Practices, please refer to:
https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html

Frequently Asked Question: How do I email an Instructor/Professor?

The following section will be relevant to all your courses at Dalhousie.

When emailing an instructor/professor, please remember to:

- **Always use your “@dal.ca” email account.** This is very important, especially if you are discussing grades. Many instructors/professors will not respond with personal information, such as grades, unless you are writing from your Dalhousie email account. *This is particularly true in First Year Chemistry.*
- Use an **informative subject line.** Many instructors/professors get hundreds of emails a day. This keeps an email from getting lost or forgotten.
- Use an **appropriate greeting.** Most faculty will let you know if they want to be addressed more formally (*example: Dr. Crane*) or more informally (*example: Angela*). If you are unsure, typically you would assume a formal greeting at first to maintain professionalism.
- Keep emails **professional**, this means no “text speak”, and writing in full sentences.
- Include the **course code.** Many instructors/professors teach multiple classes, and will not be able to assist you if they do not know which course you are in.
- Sign your email with your **full name and student ID (Banner number, ie. B0#####)**. This is very important as often classes can have students with the same or similar names, and we want to be able to make sure you get the correct information for you. *This is especially true in a big class like First Year Chemistry, where there are typically over 1000 students per term!*

<p>Date: Monday, 11 Sept 2023 11:49:19 -0700 From: rufftime@randomemailaccount.com To: chemlect@dal.ca Subject: i need 2 cu</p> <hr/> <p>yo</p> <p>i need 2 cu asap cuz idk ne chem. 2moro ok 4u?</p> <p>ttfn B-dawg</p> <p><i>Sent from my phone</i></p>	<p style="font-size: 2em; color: blue; transform: rotate(-15deg); opacity: 0.5;">WRONG</p>	<p>Date: Monday, 11 Sept 2023 11:49:19 -0700 From: br123456@dal.ca ← Official Dal Email Account To: chemlect@dal.ca Subject: Chem 1011 – Schedule an appointment ← Informative subject line</p> <hr/> <p>Dear Dr. Crane, ← Appropriate greeting</p> <p>My name is Brody and I am in your Chem 1011 class. I would like to make an appointment with you to discuss study techniques. Do you have any time next Tuesday to meet with me? I am available from 10am – 4pm. ← Full sentences, no “text speak”, Course number</p> <p>Sincerely,</p> <p>Brody “the dog” Garnier ← B00123456 ← Student ID (Banner Number) <i>Sent from my phone</i></p>
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- **Note: The student “Brody Garnier” used in this email example is fictitious and no identification with actual persons (living or deceased) is intended or should be inferred. In fact, the “Brody Garnier” referred to here is Dr. Crane’s dog.*

Frequently Asked Question: How do I access CAPA?

Many of the online assessments in both the lecture and laboratory component will be hosted on the online learning platform, CAPA, which can be accessed by going to <https://capa.chemistry.dal.ca/>. Please use the following instructions when logging into CAPA for the first time:

1. Go to <https://capa.chemistry.dal.ca>
2. Click “Forgot password?”
3. Input your LON-CAPA username (your NetID using **lowercase** letters, example: aa123456) and your Dalhousie e-mail address in LON-CAPA (your NetID@dal.ca, example: aa123456@dal.ca) and press “Proceed”.
4. Check your Dalhousie e-mail. An email will be sent from LON-CAPA helpdesk containing a password reset link. Click this link.
5. Once again, input your LON-CAPA username (NetID, lowercase), your Dalhousie e-mail address (NetID@dal.ca) and set/confirm a password and click “Save”.
6. You will get a confirmation page and email for the reset of your password. Next click “Go to the login page”.
7. From now on you will be able to login as normal with your LON-CAPA username (NetID, lowercase) and the password you created.
8. If you have issues logging into CAPA please email help@conceptsinchemistry.ca

Frequently Asked Question: What happens if the course gets interrupted?

In the event that any course activity is interrupted due to snow, power outage, or any other event/circumstance in Halifax or at Dalhousie University that is beyond the First Year Chemistry Teaching Team’s control, please pay close attention to your Dalhousie Email Account and the Announcements made on the Brightspace Course Sites for the most up to date information.

Frequently Asked Question: What should I do if I become sick during term?

As always, we realize that we are all human, and getting sick during term is something that happens to the best of us (even us as instructors!). This is particularly on our mind as we have just experienced the COVID-19 Global Pandemic, which in many ways is still affecting us. As such, we wanted to address this point specifically.

First, if you are ill and unable to complete course work, do not panic, and instead contact **both** chemlect@dal.ca and chemlab@dal.ca as soon as you can. The sooner we know the situation the sooner we can develop a plan. If it is a short illness, the course policies laid out in this syllabus may already cover the plan of action. Please take note of the policies surrounding individual course assessments as you read through. If it is a long-term illness that is affecting several weeks of classes then we will be working with students on a case-by-case basis, along with the Student Accessibility Centre and the Assistant Dean of Science dedicated to Student Affairs, to determine the best plan for finishing course work.

Important Note: *No extensions or exemptions will be given for any assignment/assessment that counts towards Experience Points or are worth less than 5%. This is because there is already flexibility built into their grading (i.e. assignments are available for a long period of time, best before and expiry or late work due dates exist, only the top questions/assignments counting for full marks and the possibility to gain bonus marks) or these assignments are worth a negligible amount (≤1%).*

Section 2: Lecture Component

Required Lecture Materials

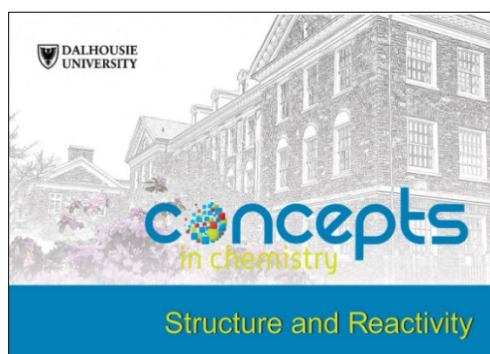
Course Textbook

Concepts in Chemistry: Energy and Equilibrium (2025–26 Ed.)

This course textbook is a custom eBook and is updated frequently to reflect changes in the curriculum. The textbook includes many practice problems, including exam bank problems which are located in an appendix at the end of the book, making this a valuable resource for mastering course content and preparing for the Mastery Exams.

Students are strongly encouraged to obtain a copy to support their learning and success in the course.

This eBook is available through the Dalhousie Bookstore only.



Non-programmable Scientific Calculator

Only 2 types of calculators are permitted during exams in Chem 1011/1021.

It is required that students registered in engineering and physics have the **CASIO fx-991ES PLUS** calculator, or equivalent (such as the CASIO fx-991ES PLUS C, CASIO fx-991ES PLUS 2 and the CASIO fx-991ES PLUS C 2nd edition)

It is required that all other science students have the **SHARP EL-510 series calculator** (the current model is the SHARP EL-510RTB, but older models such as the SHARP EL-510RNB will be accepted).

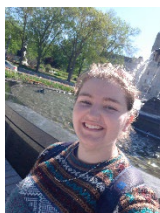
Both calculators are available at the Dalhousie Bookstore, however students may be able to find these calculators from alternative vendors.



CASIO fx-991ES PLUS



SHARP EL-510RTB

Lecture Teaching Team


Sam Knight
(pronouns: she/her)

Main Lecturer
MTWRF 12:35pm – 2:55pm
Sir James Dunn Building, Room 117



Tyler Ziehl
(pronouns: he/him)

Lecture TA
(Concept Room)



Peter Fox
(pronouns: he/him)

Lecture TA
(In-class support &
Concept Room)

Lecture/Class Schedule

Each lecture/class will provide both a lecture/learning portion and a problem-solving portion. It will be critical that students come to class prepared having either read/skimmed the chapter in the textbook or watched the pre-class videos posted on the “CHEM1011 and CHEM1021 - Concepts in Chemistry I - Lecture – 2026 Summer” Brightspace Course Site. This course has an incredibly fast pace, so arriving in class prepared to learn *and* practice the material will be important.

Date	Activity	Content
Monday, May 11	Problem Solving Session 1	Self-Study A2 (up to & including Section A2.8)
Tuesday, May 12	Problem Solving Session 2	Self-Study A2 (starting at Section A2.9) & A3
Wednesday, May 13	Problem Solving Session 3	Topic 1
Thursday, May 14	Problem Solving Session 4	Topic 2
Friday, May 15	Problem Solving Session 5	Topic 3
Monday, May 18	Holiday	No classes; University Closed
Tuesday, May 19	Mastery Exam 1	Covers SSA2 & SSA3 + Topics 1-3
Wednesday, May 20	Problem Solving Session 6	Topic 4 & 5 (up to and including Section 5.5)
Thursday, May 21	Problem Solving Session 7	Topic 5 (starting at Section 5.6)
Friday, May 22	Problem Solving Session 8	Topic 6 & 7
Monday, May 25	Problem Solving Session 9	Topic 8
Tuesday, May 26	Mastery Exam 2	Covers Topics 4-8
Wednesday, May 27	Problem Solving Session 10	Topic 9
Thursday, May 28	Problem Solving Session 11	Topic 10
Friday, May 29	Problem Solving Session 12	Topic 11
Monday, June 1	Problem Solving Session 13	Topic 12
Tuesday, June 2	Mastery Exam 3	Covers Topics 9-12

Experience Points

Experience points (XPs) are acquired by preparing for class, participating in-class, practicing the material, preparing/studying for exams and engaging with the chemistry content. There are **many** different ways in which you can acquire experience points. Each activity is listed below along with the XPs you can earn from the activity.

The more you prepare, participate, practice, and study, the more XPs you will acquire. In total there are 3 Mastery Exam units (see section on Mastery Points for details). Each Mastery Exam unit is worth 3.33 marks, for a total of 10 marks on XPs overall. Based on the number of XPs you obtain you will be assigned a grade out of 3.33, based on the following criteria **per each of the three (3) Mastery Exam units**:

Level 1: 40% of possible XPs – Grade of 0.67 out of 3.33

Level 2: 50% of possible XPs – Grade of 1.33 out of 3.33

Level 3: 60% of possible XPs – Grade of 2 out of 3.33

Level 4: 70% of possible XPs – Grade of 2.67 out of 3.33

Level 5: 80% of possible XPs – Grade of 3.33 out of 3.33

BONUS LEVEL: 90% of possible XPs – Grade of 3.67 out of 3.33

Note: No extensions or exemptions will be given for any assignment/assessment that counts towards Experience Points. This is because there is already flexibility built into their grading (i.e. best before and expiry due dates and only the top 80% of points per unit counting for full marks).

Daily Homework Questions

Description of this activity

These questions will be found on CAPA in the “First Year Chemistry Lectures – 2026 May” course space. You will have 5 attempts per question to get the question correct. Questions are open from the beginning of the course and **best completed before the next class/topic is covered**. For example, questions from Self-Study A2 (covered on May 11) will be due at 12:35 pm on May 12. These questions could also be used for studying for exams, at a lesser XP value.

How to gain XPs from this activity?

Each daily homework question is worth 2 XPs for getting the correct answer to each question by the “best before” date of **12:35pm before the next scheduled class**.

- OR -

Each daily homework question is worth 1 XP for getting the correct answer to each question by the “expiry before” date of **12:35pm before the Mastery Exam it is covered on**.

Example: A student completes 2 daily homework questions for May 11 correctly on May 11 in the evening, 1 daily homework question for May 11 correctly on May 13 and does not correctly answer 1 daily homework question for May 11 within the 5 tries. Therefore, this student will get $2 \times 2 + 1 \times 1 + 0 = 5$ XPs (out of a maximum of 8 XPs) for the May 11 pre-class questions.

In-Class Engagement Questions

Description of this activity

These questions will be provided during class time based on the pre-class videos and questions. Attending class and collaborating with your peers is a valuable experience, therefore more points are awarded to students who submit these questions during class time. Students will be able to submit their response only on the days we have class, and these questions are submitted for grading **during class time online** via MS Forms. The MS Form is open from 12noon to 4:30pm on class days.

Note: *Students are asked to bring an electronic device that can connect to the internet (smart phone, tablet, laptop) to class for this activity. If you do not have such a device, please reach out to chemlect@dal.ca and we can provide an alternative.*

How to gain XPs from this activity?

Each in-class engagement question is worth 3 XPs for getting the correct answer to each question **during class time on class days**.

Example: A student attempts the in-class engagement questions for May 11, submitting their response during class online through the MS form. Imagine there are 6 questions for this class, and the student gets 4 questions correct, and the others incorrect. This student will get 12 XPs for May 11.

Post-Topic Checkpoints

Description of this activity

Post-Topic Checkpoints are timed assessments found on CAPA in the “First Year Chemistry Lectures – 2026 May” course space that can be used in order to prepare you for a Mastery Exam. Each checkpoint will consist of 5 questions based on the skills required to be successful in the given topic on an exam. Also, each Checkpoint will be delivered in the “escape room” game style, where correctly answering a question unlocks/opens the next question until the Checkpoint is complete. Once a Checkpoint is started a 45-minute timer will be activated during which time the Checkpoint must be completed. If all questions are answered correctly on the first try, it should take approximately 20 minutes for a Checkpoint to be completed. This timing is comparable to that of a Mastery Exam. Each question within a Checkpoint has 6 tries. Every attempt has a decreasing point value associated with it. For full marks, the question must be answered on the first try. Each subsequent try will see a loss of 0.1 marks per try on that question. This is summarized in full below:

- Answer correctly on the 1st try** – 1 out of 1 on the question
- Answer correctly on the 2nd try** – 0.9 out of 1 on the question
- Answer correctly on the 3rd try** – 0.8 out of 1 on the question
- Answer correctly on the 4th try** – 0.7 out of 1 on the question
- Answer correctly on the 5th try** – 0.6 out of 1 on the question
- Answer correctly on the 6th try** – 0.5 out of 1 on the question

If the question is not correctly answered in the 6 tries, then a grade of 0 will be given on that question and the next question will automatically unlock so students can continue.

How to gain XPs from this activity?

Up to 15 XPs per Post-Topic Checkpoint will be awarded based on the following rubric:

Grade out of 5	Number of XPs
4.5+	15
4-4.4	14
3-3.9	13
2-2.9	12
1-1.9	11
0.5-0.9	10

Note: Post-Topic Checkpoints must be completed **BEFORE** the relevant Mastery Exam begins at 12:35pm.

Example: A student completes the Post-Topic Checkpoint for Topic 1 on May 14 with a grade of 4.1/5. This student will receive 14 XPs since they have completed the Checkpoint before 12:35pm on May 19 (before Mastery Exam 1 occurs) given that Topic 1 is evaluated on Mastery Exam 1.

Practice Exams

Description of this activity

In order to prepare you for Mastery Exams, there will be a practice exam uploaded to CAPA in the “First Year Chemistry Lectures – 2026 May” course space. This practice exam will contain exam-like questions with 1 try each and be timed in a similar way to the Mastery Exam that you complete in person.

How to gain XPs from this activity?

Up to 50 XPs per Practice Exam will be awarded based on the following rubric:

Grade on Practice Exam	Number of XPs
90-100%	50
80-89%	40
70-79%	35
60-69%	30
50-59%	25
40-49%	20
30-39%	15
20-29%	10
10-19%	5

Note: Practice Exams must be completed **BEFORE** the relevant Mastery Exam begins at 12:35pm.

Example: A student completes the Practice Exam for Mastery Exam 3 on May 29. They get a grade of 68%. Therefore, the student will receive 30 XPs as the Practice exam was completed before the deadline of June 2 at 12:35pm (before Mastery Exam 3 occurs).

Mastery Points

Mastery points are acquired through Mastery Exams, which will be evaluating the learning objectives of the course. In order to be successful in subsequent courses (for example CHEM1012/1022 and beyond) it is critical that students have mastered the learning objectives in CHEM1011/1021. Mastery points will be awarded based on the final overall grade for each Mastery Exam, and each Mastery Exam is comprised of 2 parts – the individual portion and the group portion. Together, the combination of all three (3) Mastery Exam grades is worth 60% of the course overall at **20% per exam**.

Mastery Exams are graded based on skills mastery. The skills that we will be examining can be found in the Skills Inventory section at the beginning of each “Exam Bank” appendices at the end of the Course Textbook. Skills will be graded on a pass/fail basis, meaning part marks on questions are typically not awarded (i.e. the skill graded as fully mastered or not).

Individual Portion of Mastery Exams

The details of each individual Mastery Exam are as follows:

- Mastery Exams, including the main content covered on each, will occur on the following dates:

Mastery Exam 1: Tuesday, May 19 covering Self-Study A2 & A3, Topics 1, 2 & 3

Mastery Exam 2: Tuesday, May 26 covering Topics 4, 5, 6, 7 & 8*

Mastery Exam 3: Tuesday, June 2 covering Topics 9, 10, 11 & 12*

*on these exams there will be 1-2 questions from **any previously tested Topic**. Therefore, Mastery Exams 2 and 3 has “cumulative” element to them.

- Each Mastery Exam will occur **during class starting at 12:35pm sharp** and will be scheduled to last 60 minutes once started.
- Students will be provided with a copy of the **“Data, Equations and Periodic Table”** found on the “CHEM1011 and CHEM1021 - Concepts in Chemistry I - Lecture – 2026 Summer” Brightspace Course Site. In addition, students will need to **bring their own approved non-programmable scientific calculator. Be sure to have an approved calculator as all other calculators are prohibited.** See the “Required Lecture Materials” section of this syllabus for information on approved calculators. Besides a calculator and writing utensils, no other materials are permitted in the exam. This includes, but is not limited to the course textbook, course notes, extra paper, data sheets brought from home, “cheat” sheets and pocket periodic tables.
- Mastery Exams are **individual assessments**, therefore no collaboration with other students is allowed.

Group Portion of Mastery Exams

Group exams are the second phase in a two-stage testing model. Two-stage testing is when students complete an exam individually first, then get a chance to repeat the exam (or a similar version of the exam) as a member of a small group. The intention of the group exam is to allow an exam situation to not only be an assessment, but also a valuable learning experience. This is because writing a group exam has many advantages, such as discussing chemistry with your peers, learning from your mistakes soon after writing an exam, clearing up misconceptions you may have had, and an overall reduction in exam anxiety. Collaboration/teamwork and communicating about science are critical skills that scientists must begin to develop in their undergraduate degrees, therefore participating in the group exam portion of each Mastery Exam is **mandatory**.

Each Mastery Exam will have a corresponding group exam that takes place **directly after the individual exam, at 1:55pm**. The dates for the group exams are listed below.

Group Exam 1: Tuesday, May 19

Group Exam 2: Tuesday, May 26

Group Exam 3: Tuesday, June 2

The group exams will follow many of the rules of the Mastery Exam, however students will be allowed to create a **cue sheet** that can be brought to the **group portion of the exam only**. This cue sheet must be no larger than a standard 8.5x11 sized paper, hand-written, and can be completed on both sides (i.e. double sided). No other additional materials (textbooks, course notes, tablets/laptops and cell phones) will be permitted for the group portion of the exam.

The Group Exam is mandatory; take the Group Exam seriously since the grade on your group exam will affect your overall Mastery Exam grade. Your overall Mastery Exam grade will be calculated based on BOTH the individual Mastery Exam and the group exam grades, where individual Mastery Exam counts for 80% of the overall Mastery grade, and the Group Exam counts for 20% of the overall Mastery grade.

For example, if a student receives 60% on the individual portion of the exam, and then 80% on the group exam, their final Mastery Exam grade would be $0.6 \times 80 + 0.8 \times 20 = 64\%$

Similarly, if a student receives 60% on the individual portion of the exam, and then does not take the group exam, therefore getting 0%, their final Mastery Exam grade would be $0.6 \times 80 + 0 \times 20 = 48\%!!!$

Make-up Mastery Exams

Due to the pace and condensed nature of the summer term, each Mastery exam is considered a "Final Exam". This means that if a student misses a Mastery Exam for illness, they will need to submit a doctor's note stating the date of the exam they missed to chemlect@dal.ca within 72 hours of the exam (i.e. 12:35pm on Fridays). Make-up exams for students who have submitted a doctor's note and approved for a make-up exam will occur on the Friday after the original exam after class.

Section 3: Laboratory Component

**Location:**

Basement of the Chemistry Building
Room 100-108P

Summer 2026 Lab Schedule:

The lab schedule is posted on Brightspace and in the syllabus.

Labs Begin:




Monday, May 11th, 2026

Contacting Your Lab Instructor:

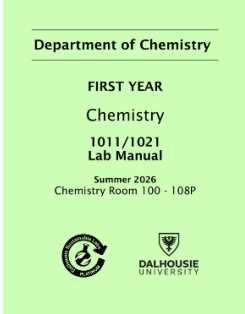



The laboratory instructor team communicates with students through one common email address, chemlab@dal.ca. Please include your lab section in the email subject line.

Laboratory Instructors

Please note that differing laboratory sections have differing laboratory instructors. Refer to the sections written on the right to determine who your laboratory instructor is. Please note that lab sections/instructors may change, and for the most up-to-date list of instructors and sections, please refer to the Lab Brightspace Page.

Instructor Photo	Instructor Name	Lab Sections
	Dr. Jennifer MacDonald (pronouns: she/her)	Lab Section A
	Dr. Marc Whalen (pronouns: he/him)	Lab Section B
	Ryan Snitynsky (pronouns: he/him)	Lab Section C

Required Materials for Lab

Lab Material Photo	Lab Material Description
	Lab Manual Available at the Dalhousie Bookstore (~\$25.99 + tax)
	Hardcover Lab Notebook Available at the Dalhousie Bookstore (~\$10.99 + tax)
	Safety Glasses Must be stamped with standards numbers of: CSA-Z94-3 (Class 1A) Available at the Dalhousie Bookstore Safety Glasses (~\$8.99 + tax) "OR" Safety Glasses For Over Glasses (~\$8.99 + tax)
	Knee-length Lab Coat (100% cotton) Available at the Dalhousie Bookstore (~\$29.99 + tax)

Safety Module and Lab Map

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 and Lab Map. **Students who do not successfully complete this requirement will not be allowed to perform experiments in any Dalhousie undergraduate chemistry lab. Experiments missed due to incomplete Safety Modules do not qualify for a make-up lab session.** The Safety Module and Lab Map Content is found in the “CHEM1011 & CHEM1021 – Concepts in Chemistry I – Lab – 2026 Summer” Brightspace Course Site in the content area “Laboratory Orientation and Safety”. Successful completion of the Safety Module Assignment includes reading the General Safety Statement on Brightspace and obtaining a perfect mark (i.e., 100%, 25 out of 25) on the five Safety Module Quizzes (located in CAPA on the First Year Chemistry Labs – 2026 May course space). Successful completion of the Lab Map Assignment includes completing the virtual laboratory tour on Brightspace, submitting your responses on CAPA, and obtaining a perfect mark (i.e. 100%, 35 out of 35). 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.

Completion of the Safety Module and Lab Map, which is evaluated based on the submission of the CAPA Assignments, is **worth 1% of the overall final grade**. To receive a grade of 1 out of 1 on the Safety Module and Lab Map Assignment, the Safety Module and Lab Map Assessments must be submitted via CAPA by **5:30 pm local Halifax time on Sunday, May 17, 2026**.

Any Safety Module and Lab Map Assessments completed after the due date will not be graded, and partially complete Safety Module and Lab Map Assessments will receive a grade of zero (0).

No deadline extensions will be given on the Safety Module and Lab Map Assessments and “Student Declaration of Absence” forms cannot be applied to the Safety Module and Lab Map Assessments, as the assessments are open and available to students for more than 3 days.

WHMIS Course Module

WHMIS, the Workplace Hazardous Materials Information System, is a global harmonized system used to classify and label hazards and regulate handling procedures within industry and academic fields, especially those in science and engineering. Regardless of your chosen field of study within science and engineering beyond first year, being familiar with WHMIS is a significant asset. As such, it is required that ALL students in first year chemistry enrol in and complete the Dalhousie University WHMIS Safety course provided by the Dalhousie Environmental Health and Safety Office offered through the Faculty of Open Learning and Career Development. As this course is substantial in nature, **completion of the course will be worth 3% of your final grade.** Instructions for how to register for the course are found on the Lab Brightspace Site under the content area "Laboratory Orientation and Safety." Please ensure that you register and complete the WHMIS course well in advance of the deadline (**5:30 pm local Halifax time on Sunday, May 17, 2026**).

Students who do not successfully complete this requirement will not be allowed to perform experiments in any Dalhousie undergraduate chemistry lab. Experiments missed due to incomplete WHMIS Training do not qualify for a make-up lab session.

Completion of the WHMIS Course Module is worth 3% of the overall final grade. **Only the Dalhousie WHMIS Safety Course Completion will be accepted for credit in Chem 1011/1021.**

Any WHMIS Course Modules completed after the due date will not be graded for credit and partially complete WHMIS Course Modules will receive a grade of zero (0).

No deadline extensions will be given on the WHMIS Course Module and "Student Declaration of Absence" forms cannot be applied to the WHMIS Course Module, as the Module is open and available to students for more than 3 days.

NOTE: Please ensure that you retain a copy of your WHMIS Completion Certificate. If you take any further chemistry courses at Dalhousie or work in a chemistry research lab, you will be required to provide your proof of WHMIS training.

Laboratory Format, Expectations and Policies

You will complete seven lab sessions this term. Some experiments run for 1.5 hours while others run for 3 hours. Please be sure to check your experiment start time in the course syllabus as it may differ from the start time noted on your DalOnline class schedule. Before leaving your first in-person lab period, make sure that you understand your Lab Schedule.

Experimental work must be completed during the scheduled time for your particular section.

Attendance is mandatory for in-person labs.

Online Experiments:**Suggested Pathway Through an Online Lab Module**

Each lab module contains:

1. The experimental background/theory
2. Pre-laboratory assignment support/practice questions and link to CAPA Site
3. Experiment content, data acquisition, and recording observations
4. Post-Lab Report

When beginning your experiment, you should work through the experimental background/theory sections of the module and the pre-laboratory assignment support/practice questions. Once you have completed these sections of the module and feel comfortable with the content, launch your CAPA Pre-lab Assignment and work through this assignment before the deadline.

After you have completed the Pre-Lab Assignment, you should move on to the experimental section of the laboratory module. Within this section of the module, you will be guided through the laboratory procedure and observe the experiment as it is being carried out through video. You will be able to record your observations in real-time in the module, this will become your experimental raw data set. Your experimental raw data set will be summarized at the end of the experimental section as a "Raw Data Summary" page. It is strongly recommended that you print (there is a print button available on the raw data slides) or write down a copy of your data to ensure a secondary back-up of your work. This raw data set will be required to complete your post-lab report.

Post-Lab Reports for online experiments will be submitted at your first in-person laboratory session.

In-Person Experiments:

Before Your Experiment

You are expected to read the experiment, prepare your hard-covered notebook, and complete the pre-lab questions on CAPA.

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:

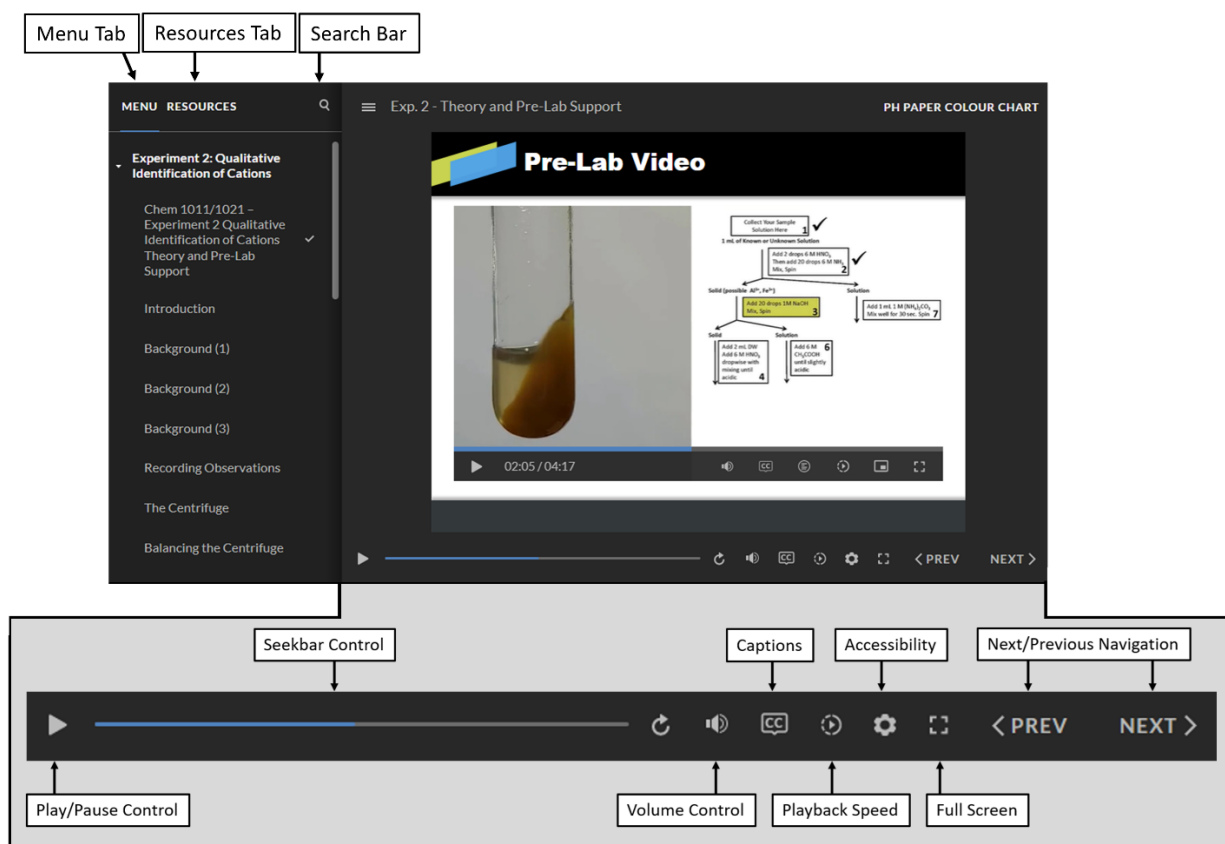
- Date
- Title of Experiment
- Data Tables and Observations from Raw Data Sheet. *If the experiment does not have a Raw Data Sheet, please use the Grade Sheet in your lab manual as a guide to prepare your lab notebook.*

Theory and Pre-Lab Support Module Structure

In addition to the content in your lab manual, there are optional Theory and Pre-Lab Support Modules on Brightspace that you may wish to use as you prepare for your CAPA Pre-Lab Assignments and your upcoming experiments. These modules contain a detailed walkthrough of theory, experimental videos, and interactive practice problems (with solutions!).

The lab module player features a menu, resources tab, and many more navigation controls to customize your experience. The Menu at the left allows you to navigate to any point in the module by slide title. The Resources tab at the left contains useful links and downloadable files (printable audio transcripts, data tables, and links to the CAPA pre-lab assignment site).

An image of a Theory and Pre-Lab Support module can be found below, pointing out the menu and resources tabs, as well as the search bar, play/pause, seekbar, volume, captions, playback speed, accessibility, full screen, and previous/next navigation controls.



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 collect 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 post-lab report (the Grade Sheet found in the lab manual). More information about the post-lab report weighting scheme and due dates can be found in the Post-Lab Report Weighting Scheme and Post-Lab Due Dates sections of the syllabus. Written reports **must be completed in dark pen (blue or black ink).**

Laboratory Schedule

The exact laboratory schedule will be different for each student depending on their laboratory section. Please find **your lab section** and highlight the row to find **your laboratory experiment schedule**. Online lab sessions are asynchronous and in-person lab sessions are synchronous.

Sect.	Exp. 1	Exp. 2	Exp. 3	Exp. 4	Exp. 5	Exp. 6	Exp. 7
A/B	May 11-15 Online	May 11-15 Online	Wed., May 20 9-10:30 am	Thurs., May 21 9 am-12 pm	Mon., May 25 9-10:30 am	Wed., May 27 9 am-12 pm	Fri., May 29 9-10:30 am
C	May 11-15 Online	May 11-15 Online	Wed., May 20 10:30 am-12 pm	Fri., May 22 9 am-12 pm	Mon., May 25 10:30 am-12 pm	Thurs., May 28 9 am-12 pm	Fri., May 29 10:30 am-12 pm

Pre-Lab CAPA Assignments

All pre-lab Assignments will be hosted on the online learning platform, CAPA in the First Year Chemistry Labs – 2026 May course space, which can be accessed by going to <https://capa.chemistry.dal.ca>. Please refer to the instructions in the syllabus when logging into CAPA for the first time.

Pre-Lab Assignments will open on the first day of class.

The online pre-lab assignments have been developed to help you prepare for the lab. Pre-Labs are **individual assessments**. Students may seek support through the online Theory and Pre-Lab Support Modules, Concept Room, Resource Centre, and discussion boards from TAs/Instructors, the laboratory coordinator, and classmates. However, all pre-lab 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). The Theory and Pre-Lab Support Module for each experiment contains content to support you in completing the pre-lab assignment. We encourage you to start early to ensure you are able to get help with the questions that cause you difficulty. You will be given **13 tries at each question**. The first 3 tries will be for full marks. For each subsequent try 10% of the questions point value will be deducted. **Each Pre-Lab is worth equal weight for a total of 5%.**

Online Labs: CAPA pre-labs assignment for Experiments 1 and 2 are due: **Sunday, May 17th at 5:30 PM local Halifax time.**

In-Person Labs: CAPA pre-labs for in-person labs are due **5 minutes before your regularly scheduled lab**. For example, if a student is in lab section A and has a lab session beginning on May 20, 2026 at 9:00 AM, their pre-lab would be due on May 20, 2026 at 8:55 AM. **If for any reason you have made alternate arrangements for your lab session, your pre-lab deadline will remain the same, 5 minutes before your regularly scheduled lab.** No deadline extensions will be given on CAPA Pre-Lab Assignments as these assessments are open and available to students for more than 3 days.

Preparedness

When working in the lab it is important and expected that you arrive prepared for your session to ensure that you are a supportive and safe member of your lab group. For each Laboratory Experiment, students will be graded on their preparedness for the experiment. Preparedness includes completing the Pre-Lab Assignment on CAPA as well as arriving to the lab with their laboratory notebook prepared for in-person experiments. Student preparedness is **worth 1% of the overall lab grade**. A student who is unprepared 3 or more times during term will not be awarded this grade.

Participation: Data Collection and Raw Data Submission

Chemistry is first and foremost an experimental science. Your time in the laboratory is an important part of your chemical education. As such, participation is worth 3% of the overall lab grade. Participation is assessed via submission of your experimental data set through raw data sheets or in-lab report submissions for experiments that do not have a raw data sheet. **Each experiment's participation grade is worth equal weight for a total of 3%.**

Lab Station Clean-Up

Developing good lab housekeeping habits reduces the occurrence of lab accidents while also improving efficiency and quality of lab work completed in shared lab spaces. It is our shared responsibility (students and teaching team) to ensure the laboratory is a safe working environment. As such, lab station clean-up is worth 1% of the overall lab grade. The lab station clean-up grade will be assessed at the end of all 3-hour lab sessions. To be awarded this grade, your locker should contain only the required glassware and your bench space is left clean. **Each lab station clean-up grade is worth equal weight for a total of 1%.**

Post-Lab Due Dates

A detailed table of all post-lab due dates is to follow. Please find **your lab section** and highlight the row to find **your post-lab due date schedule**.

Sect.	Exp. 1	Exp. 2	Exp. 3	Exp. 4	Exp. 5	Exp. 6	Exp. 7
A/B	May 20 9 am	May 20 9 am	May 21 9 am	May 25 9 am	May 25 10:30 am	May 29 9 am	May 29 10:30 am
C	May 20 10:30 am	May 20 10:30 am	May 22 9 am	May 25 10:30 am	May 25 12 pm	May 29 10:30 am	May 29 12 pm

Post-Lab Report Weighting Scheme

Each Post-Lab Report contributes to your lab grade according to the following weighting scheme:

Experiment 1:	1.5%
Experiment 2:	2.5%
Experiment 3:	1.5%
Experiment 4:	2.5%
Experiment 5:	2.0%
Experiment 6:	3.0%
Experiment 7:	2.0%
Total:	15%

Time Management

Besides arriving to the laboratory experiments on time, we expect students to manage their time outside of lab accordingly such that their post-lab reports are submitted on time. Therefore, effective time management is **worth 1% of the overall lab grade**. We do realize that occasionally a student may submit a post-lab report late; therefore, students with a maximum of 1 late report will still receive the time management grade. Post-lab reports submitted after the scheduled due dates will be accepted, but marked late, **if and only if** the post-lab report is submitted **BEFORE** the Late Work Submission Deadline. Late work is not accepted after the Late Work Submission Deadline as marked reports and feedback will be returned to students.

Missed Labs and Make-up Experiments

Online Labs: All online experiments will be available for students to complete after the Post-Lab Due Dates and until the Late Work Submission Deadlines. You do not need to make arrangements for a make-up lab for online experiments.

In-Person Labs: Please note that due to our high course enrollment, you are only guaranteed that your timetabled lab session will be available to you for your experiments as outlined in the syllabus. 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 may result in a grade of 0 for the missed lab. Make-up experiments are scheduled based on available seats in the laboratory, as a result, make-up lab session availability cannot be guaranteed.

Your email must include:

Subject line:	Body of your message:
1. course number	1. your name
2. lab section (e.g. B01)	2. student ID (B00#)
	3. course number and lab section
	4. experiment(s) missed
	5. your availability to attend lab sections leading up to the last opportunity for make-up labs (see the Lab Schedule and Last Opportunity for Make-up Labs Schedule before providing your availability)

This process filters your message to the correct instructor automatically (based on section in the subject line) which allows us to help you faster! 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 check-in with the instructor to be assigned a temporary locker space.

A few notes about make-up experiments:

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.
3. No report will be accepted after the posted late submission deadlines.

Final Dates for Make-up Experiments and Late Work Submissions

Exp.	Last Opportunity for Make-up Lab (Group A/B)	Last Opportunity for Make-up Lab (Group C)	Late Work Submission Deadline (ALL Groups)
1	<i>Online</i>	<i>Online</i>	May 21 before 9 am
2	<i>Online</i>	<i>Online</i>	May 21 before 9 am
3	May 21	May 21	May 25 before 9 am
4	May 22	May 25	May 27 before 9 am
5	May 27	May 27	<i>In-lab submission only</i>
6	May 28	May 29	June 1 before 12 pm
7	May 29	May 29	<i>In-lab submission only</i>

Please ensure that you know what group you are in (based on your lab section) to adhere to the above deadlines.

Laboratory 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 67% (20/30) 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 1011/1021 in Summer 2026 and completes the course with a grade of F, has 45% on the lecture component, and a lab score greater than 67% (20/30) the student would qualify for lab exemption in the following terms: Fall 2026, Summer 2027, and Fall 2027. After the 24-month window has passed the student will be required to retake the lab component when repeating the course.






Labs exemptions will not automatically be granted. You must contact the first-year lab coordinator (chemlab@dal.ca) prior to the term add/drop date to apply for a lab exemption.

Section 4: Concept Room & Chemistry Resource Centre

The **Concept Room** is staffed by members of the First Year Chemistry Lecture team who are available to answer lecture content only.

The **Chemistry Resource Centre** is staffed by lab instructors who can assist you with any aspect of the course in lecture or lab, including CAPA assignments, and pre-lab and post-lab questions.

The Full *Concept Room* and Chemistry Resource Centre schedule can be found below:

	Monday <i>May 11</i>	Tuesday <i>May 12</i>	Wednesday <i>May 13</i>	Thursday <i>May 14</i>	Friday <i>May 15</i>		
Concept Room	3:30 – 4:30pm Tyler	10 – 11am Sam 3:30 – 4:30pm Tyler	3:30 – 4:30pm Tyler	10 – 11am Sam 3:30 – 4:30pm Tyler	3:30 – 4:30pm Tyler		
Resource Center	n/a	n/a	9am – 12pm Marc	9am – 12pm Ryan	9am – 12pm Marc		
	<i>May 18</i>	<i>May 19</i>	<i>May 20</i>	<i>May 21</i>	<i>May 22</i>		
Concept Room	Holiday – No Concept Room/Resource Center	9 – 10am Tyler 10 – 11am Sam 11am – 12pm Peter	3:30 – 4:30pm Tyler	10 – 11am Sam 3:30 – 4:30pm Tyler	3:30 – 4:30pm Tyler		
Resource Center		9am – 12pm Ryan	n/a	9am – 12pm Ryan	9am – 12pm Marc		
	<i>May 25</i>	<i>May 26</i>	<i>May 27</i>	<i>May 28</i>	<i>May 29</i>		
Concept Room	3:30 – 4:30pm Tyler	9 – 10am Tyler 10 – 11am Sam 11am – 12pm Peter	3:30 – 4:30pm Tyler	10 – 11am Sam 3:30 – 4:30pm Tyler	3:30 – 4:30pm Tyler		
Resource Center	n/a	9am – 12pm Marc	9am – 12pm Ryan	9am – 12pm Marc	n/a		
	<i>June 1</i>	<i>June 2</i>					
Concept Room	3:30 – 4:30pm Tyler	9 – 10am Tyler 10 – 11am Sam 11am – 12pm Peter					
Resource Center	9am – 12pm Ryan	n/a	<i>Sam</i> (she/her)	<i>Peter</i> (he/him)	<i>Tyler</i> (he/him)	<i>Marc</i> (he/him)	<i>Ryan</i> (he/him)

Section 5: Course Content & Learning Objectives

Course Description

Credit Hours: 3

The electronic structures of atoms and molecules are used to explain the reactivity and properties of chemicals. Topics include atomic structure, bonding models, structure and shape of molecules and ions, and acid/base chemistry.

It is recommended that students have Nova Scotia Grade 12 chemistry or equivalent before taking this course.

COORDINATORS: A. Crane, J. MacDonald

FORMAT: Lecture | Lab

LECTURE HOURS PER WEEK: 12.5

LAB HOURS PER WEEK: 15

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 and Goals

Our primary objective for First Year Chemistry is to offer you a comprehensive and relevant course on the fundamental concepts in chemistry. Our focus is on using problem solving techniques which are applicable and transferrable to all fields of science and engineering and are not limited to just the chemistry lens used in this course. We aim to help students build good independent study habits, time management skills, group collaborations and foster critical thinking in the sciences. By exemplifying the role of chemistry in our daily lives and in an interdisciplinary way, we hope that our students gain an appreciation for chemistry, regardless of their end academic goals.

Course Learning Outcomes

- State the name or chemical formula for common chemical species.
- Demonstrate problem solving skills in the context of chemistry.
- Draw orbitals and molecules using atomic and bonding theories.
- Predict, compare and explain properties of atoms and molecules using electronic and energetic arguments.
- Demonstrate understanding of laboratory safety and laboratory techniques including pipetting, titrating, and centrifuging.
- Analyze and interpret observations and data to arrive at experiment conclusions.
- Report laboratory observations and data in an organized and logical manner.

Course Content*Self-Study A1: Mathematics in Chemistry*

Accuracy and Precision
Significant Figures
Multiple Measurements: Averages and Standard Deviations
Logarithms/Mathematics and Chemistry
Solving Problems Using Dimensional Analysis

Self-Study A2: Introduction to Chemistry

Element Names and Symbols
Cations, Anions and Regions of the Periodic Table
Naming Inorganic Compounds (Nomenclature)
Fundamental Units of Measurement for Chemistry
Molecules, Molecular Formulae, Molecular Mass and Formula Mass
The Mole, Avogadro's Number and Molar Mass
Writing Chemical Equations
Procedure for Balancing Chemical Equations
Stoichiometry and Mass
Determining the Limiting Reagent
Actual, Theoretical, and Percent Yield

Self-Study A3: Quantitative Description of Aqueous Solutions

General Characteristics of Aqueous Solutions
Solution Concentration including molarity, mole fraction and mass percent
Dilution
Reactions Involving Aqueous Solutions
Dissociation and Net Ionic Equations

Topic 1: Atomic Structure and Line Spectra

Subatomic Particles
Mass Number, Isotopes, and Average Atomic Mass
Electromagnetic Radiation: A Useful Probe of Atomic Structure
Atomic Line Spectra and the Bohr Model

Topic 2: Quantum Numbers and Electron Configurations

Quantum Numbers
Shapes of Atomic Orbitals
Pauli Exclusion Principle and Hund's Rule
Relative Energies of Atomic Orbitals (Aufbau Principle)
Electron Configurations including Valence and Core configurations

Topic 3: Periodic Properties of the Elements

Effective Nuclear Charge
Atomic Size
The Size of Ions
Ionization Energy
Electron Affinity
Electronegativity
Solid State Properties: Metals, Metalloids, and Non-Metals

Topic 4: An Introduction to Chemical Bonding

Electrostatic Interactions and Ionic Bonding
Covalent Bonding

Topic 5: The Lewis Bonding Theory

Lewis Structures
Procedure for Drawing Lewis Structures
Lewis Structures for Structural Isomers
Resonance, Energy Equivalent Structures, and "Curly Arrows"
Limitations of the Lewis Bonding Model

Topic 6: Molecular Structure and VSEPR Theory

The Principles of the VSEPR Model
Procedure for Predicting Molecular Shape

Topic 7: Polarity and Intermolecular Interactions

Electronegativity and Bond Polarity
Molecular Polarity and Dipole Moment
Non-covalent Intermolecular and Inter-ion Interactions
Thin-layer and Column Chromatography

Topic 8: Valence Bond Theory and Hybridization

σ Bonds (Sigma Bonds)
Hybridizing Atomic Orbitals to Make σ Bonds
Unhybridized p Orbitals and π Bonds (Pi Bonds)
Hybridization in Compounds Containing Heavy Elements
Compounds Involving Lone Pairs in Hybrid Orbitals

Topic 9: Molecular Orbital Theory

Delocalized Electron Model
Molecular Orbital Diagram for Dihydrogen
Second Row Diatomic Molecules

Topic 10: Qualitative View of Acid-Base Equilibria in Aqueous Solution

Strong Acids and Bases
Weak Acids and Weak Bases
The Equilibrium Constant
Auto-dissociation of Water
 pK_a and pK_b
Polyprotic Acids
Structural Influences on the Magnitude of pK_a or pK_b

Topic 11: Quantitative View of Acid-Base Equilibria in Aqueous Solution

pH and pOH
Acid-Base Reactions
Titrations Involving Strong Acids and Strong Bases
Determining the pH for Solutions of Weak Acids and Weak Bases
Solutions of Acidic and Basic Salts

Topic 12: Applications of Acid-Base Equilibria: Buffer Solutions

Buffer Solutions from a Weak Acid and Its Conjugate Base
Henderson-Hasselbalch Equation
Buffering Action
Buffer Solutions from Weak Acids (Bases) and Strong Bases (Acids)
Preparation of Buffer Solutions of a Desired pH

Laboratory Experiments

Exp. 1 – Using Indicators to Distinguish Acidic, Basic, and Neutral Solutions
Exp. 2 – Qualitative Identification of the Cations
Exp. 3 – Relative Solubilities & Limiting Reagents
Exp. 4 – Laboratory Techniques
Exp. 5 – Bonding Theories and Molecular Models
Exp. 6 – Acid/Base Titrations
Exp. 7 – Investigating pK_a of Weak Acid, Buffer Preparation, and Buffer Capacity

Section 6: University Policies and Statements

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

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

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

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.

Code: https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html

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

Statement: <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)

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

University Grading Practices

Information: https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html

Section 7: University-wide Student Resources and Support

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 Students 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>

Ombudsperson: https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html

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

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

Dalhousie COVID-19 information and updates

Information: <https://www.dal.ca/covid-19-information-and-updates.html>