

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

Welcome to Chemistry 1011/1021! We have put together a comprehensive course syllabus that will address any question you may have throughout the term. A course syllabus is meant to act as a guide, but also serves as a contract between you and your instructors, for you to set your expectations of the course and prepare yourself accordingly for the semester. Please make use of the following table of contents (with links) when navigating the course syllabus and reviewing the course due dates and policies. We hope you have an enjoyable experience in First Year Chemistry and look forward to having a productive semester.

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.

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## **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](mailto: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](mailto: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 Dates**Summer semester A1 (May 6-28, 2024)*Monday, May 6, 2024*

First day of classes for CHEM1011/1021

*Thursday, May 9, 2024*

Last day to Add/Drop CHEM1011/1021

*Monday, May 13, 2024*

Last day to Drop CHEM1011/1021 without a “W”

*Monday, May 20, 2024*

Victoria Day: University Closed

*Tuesday, May 21, 2024*

Last day to Drop CHEM1011/1021 with a “W”

*Tuesday, May 28, 2024*

Last day of classes for CHEM1011/1021

Summer semester A2 (June 3-25, 2024)*Monday, June 3, 2024*

First day of classes for CHEM1012/1022

*Thursday, June 6, 2024*

Last day to Add/Drop CHEM1012/1022

*Monday, June 10, 2024*

Last day to Drop CHEM1012/1022 without a “W”

*Monday, June 17, 2024*

Last day to Drop CHEM1012/1022 with a “W”

*Tuesday, June 25, 2024*

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](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. B00#####).** 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>tffn          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: <a href="mailto:br123456@dal.ca">br123456@dal.ca</a> ← <b>Official Dal Email Account</b>          To: chemlect@dal.ca          Subject: Chem 1011 – Schedule an appointment ← <b>Informative subject line</b></p> <hr/> <p>Dear Dr. Crane, ← <b>Appropriate greeting</b>          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. ← <b>Full sentences, no “text speak”, Course number</b></p> <p>Sincerely,</p> <p>Brody “the dog” Garnier ←          B00123456 ← <b>Student ID (Banner Number)</b>  <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](mailto:NetID@dal.ca), example: [aa123456@dal.ca](mailto: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](mailto: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](mailto: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](mailto:chemlect@dal.ca) and [chemlab@dal.ca](mailto: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.

**Student Declaration of Absence Forms**

Students can use a maximum of two (2) Student Declarations of Absence (SDA) per course per term (within May 6, 2024 and May 28, 2024), based on the Dalhousie University policies surrounding the Student Declaration of Absence forms ([https://www.dal.ca/campus\\_life/safety-respect/student-rights-and-responsibilities/academic-policies/Information%20for%20students/faqs-for-students.html](https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/academic-policies/Information%20for%20students/faqs-for-students.html)).

In Chem 1011/1021 these can be submitted for Mastery Exams only. ***This means a student can make-up a maximum of 2 Mastery Exams.***

SDA forms will not cover you if you are out for a prolonged period of time due to illness or other reasons. In these situations, email [chemlect@dal.ca](mailto:chemlect@dal.ca) and let us know as soon as possible so we can assist you most effectively. In cases of prolonged absence, withdrawing from the class, or requesting an ILL grade may be the best course of action.

## **Section 2: Lecture Component**

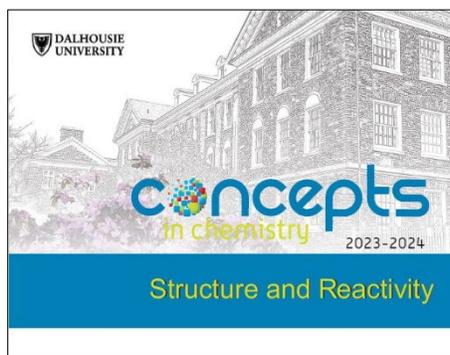
### **Required Lecture Materials**

#### ***Course Textbook***

Concepts in Chemistry: Structure and Reactivity (2023–24 Ed.)

This course book is a custom text and is updated each year to reflect changes in the curriculum. This year the book is being offered as a digital copy. The digital copy of the textbook will be housed on the Willo online platform and a link to this ebook will be posted in the “CHEM1011 and CHEM1021 - Concepts in Chemistry I - Lecture – 2023/2024 Summer” Brightspace Course Site. There is also the option to buy a digital + physical book bundle (while quantities last)

This course textbook is available at the Dalhousie Bookstore only.



#### ***Non-programmable Scientific Calculator***

Only 2 types 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 2<sup>nd</sup> 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**


*Joe Weatherby*  
(pronouns: he/him)

Main Lecturer  
MTWRF 12:35pm – 2:55pm  
Chemistry Building, Room 125



*Sam Knight*  
(pronouns: she/her)

Lecture TA and 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 – 2023/2024 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.

<b>Date</b>	<b>Activity</b>	<b>Content</b>
Monday, May 6	Problem Solving Session 1	Self-Study A2 (up to & including Section A2.8)
Tuesday, May 7	Problem Solving Session 2	Self-Study A2 (starting at Section A2.9) & A3
Wednesday, May 8	Problem Solving Session 3	Topic 1
Thursday, May 9	Problem Solving Session 4	Topic 2
Friday, May 10	Problem Solving Session 5	Topic 3
Monday, May 13	Problem Solving Session 6	Topic 4 & 5 (up to and including Section 5.5)
Tuesday, May 14	<b>Mastery Exam 1</b>	<b>Covers SSA2 &amp; SSA3 + Topics 1-3</b>
Wednesday, May 15	Problem Solving Session 7	Topic 5 (starting at Section 5.6)
Thursday, May 16	Problem Solving Session 8	Topic 6 & 7
Friday, May 17	Problem Solving Session 9	Topic 8
Monday, May 20	<b>Holiday</b>	<b>No classes; University Closed</b>
Tuesday, May 21	<b>Mastery Exam 2</b>	<b>Covers Topics 4-8</b>
Wednesday, May 22	Problem Solving Session 10	Topic 9
Thursday, May 23	Problem Solving Session 11	Topic 10
Friday, May 24	Problem Solving Session 12	Topic 11
Monday, May 27	Problem Solving Session 13	Topic 12
Tuesday, May 28	<b>Mastery Exam 3</b>	<b>Covers Topics 9-12</b>

### 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 – 2024 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 6) will be due at 12:35 pm on May 7. 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 6 correctly on May 6 in the evening, 1 daily homework question for May 6 correctly on May 8 and does not correctly answer 1 daily homework question for May 6 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 6 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 4pm 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](mailto: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 6, 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 6.

### Post-Topic Checkpoints

#### *Description of this activity*

Post-Topic Checkpoints are timed assessments found on CAPA in the “First Year Chemistry Lectures – 2024 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 1<sup>st</sup> try** – 1 out of 1 on the question
- Answer correctly on the 2<sup>nd</sup> try** – 0.9 out of 1 on the question
- Answer correctly on the 3<sup>rd</sup> try** – 0.8 out of 1 on the question
- Answer correctly on the 4<sup>th</sup> try** – 0.7 out of 1 on the question
- Answer correctly on the 5<sup>th</sup> try** – 0.6 out of 1 on the question
- Answer correctly on the 6<sup>th</sup> 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 10 with a grade of 4.1/5. This student will receive 14 XPs since they have completed the Checkpoint before 12:35pm on May 14 (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 – 2024 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 by 11:30pm the evening **BEFORE** the relevant Mastery Exam begins at 12:35pm.

**Example:** A student completes the Practice Exam for Mastery Exam 3 on May 26. They get a grade of 68%. Therefore, the student will receive 30 XPs as the Practice exam was completed before the deadline of May 28 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” handout per class. 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 14** covering Self-Study A2 & A3, Topics 1, 2 & 3

**Mastery Exam 2: Tuesday, May 21** covering Topics 4, 5, 6, 7 & 8\*

**Mastery Exam 3: Tuesday, May 28** 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.
- The intention of the Mastery Exams is for students to demonstrate mastery of the skills they have been developing over the classes leading up to the exam. 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 – 2023/2024 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, “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 14

**Group Exam 2:** Tuesday, May 21

**Group Exam 3:** Tuesday, May 28

The group exams will follow many of the rules of the Mastery Exam, however you will be allowed to use your course notes/textbook and you will be working in small groups, therefore please treat these “exams” more like problem solving sessions.

**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

***If you miss a Mastery Exam for any reason you can apply for a make-up Mastery Exam.*** The make-up Mastery Exam (individual and group) for each unit will happen at the following dates and times:

**Make-up Mastery Exam 1:** Friday, May 17 at 3 – 5:15 pm

**Make-up Mastery Exam 2:** Friday, May 24 at 3 – 5:15 pm

**Make-up Mastery Exam 3:** Friday, May 31 at 12:30 – 2:45 pm

To register for the make-up Mastery Exam, please fill out the First year Chemistry Student Declaration of Absence form <https://tinyurl.com/DalChemSummerMissedExam> by the make-up Mastery Exam registration deadline. You will then receive detailed information about the make-up Mastery Exam as soon as possible after the make-up Mastery Exam registration deadline has passed. The make-up Mastery Exam registration deadlines for each Mastery Exam are:

**Make-up Mastery Exam 1: Thursday, May 16** at 3 pm

**Make-up Mastery Exam 2: Thursday, May 23** at 3 pm

**Make-up Mastery Exam 3: Thursday, May 30** at 3 pm

***If you miss a Mastery Exam and its make-up exam entirely for any reason, you will receive a 0 on that Mastery Exam.***

**Remember:** Students can apply for a maximum of 2 make-up exams in the term, based on the Dalhousie University policies surrounding the Student Declaration of Absence forms ([https://www.dal.ca/campus\\_life/safety-respect/student-rights-and-responsibilities/academic-policies/Information%20for%20students/faqs-for-students.html](https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/academic-policies/Information%20for%20students/faqs-for-students.html)).

### Section 3: Laboratory Component

**Location:**

Basement of the Chemistry Building  
Room 100-108P

**May 2024 Lab Schedule:**

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

**Labs Begin:**

Wednesday, May 8<sup>th</sup>, 2024

**Contacting Your Lab Instructor:**

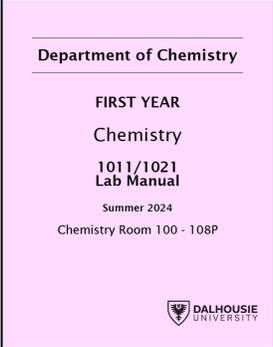
The laboratory instructor team communicates with students through one common email address, [chemlab@dal.ca](mailto:chemlab@dal.ca). Please include your lab section in the email subject line.

**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 Section
	Dr. Joshua Bates (pronouns: he/his)	A
	Gaia Aish (pronouns: she/her)	B
	Ryan Snitynsky (pronouns: he/his)	C

**Required Materials for Lab**

Lab Material Photo	Lab Material Description
	<b>Lab Manual</b> Available at the Dalhousie Bookstore (~\$25.62 + tax)
	<b>Hardcover Lab Notebook</b> Available at the Dalhousie Bookstore (~\$8.99 + tax)
	<b>Safety Glasses</b> Must be stamped with standards numbers of: CSA-Z94-3 or ANSI Z87  Available at the Dalhousie Bookstore Safety Glasses (PYRAMEX, ~\$4.95 + tax) "OR" Safety Glasses For Over Glasses (3M, ~\$5.95 + tax)
	<b>Knee-length Lab Coat (100% cotton)</b> 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 – 2024 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 – 2024 May course space). Successful completion of the Lab Map Assignment includes completing the virtual laboratory tour on Brightspace and submitting your responses on CAPA. 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 **11:30 pm local Halifax time on Sunday, May 12, 2024**.

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 (**11:30 pm local Halifax time on Sunday, May 12, 2024**).

Completion of the WHMIS Course Module, which is evaluated based on the submission of your WHMIS Completion Certificate via Microsoft Forms, is **worth 3% of the overall final grade**. To receive a grade of 3 out of 3 on the WHMIS course module, the WHMIS Completion Certificate must be submitted via Microsoft Forms by **11:30 pm local Halifax time on Sunday, May 12, 2024**. **Only the Dalhousie WHMIS Safety Course Completion Certificate will be accepted for credit in Chem 1011/1021.**

Any WHMIS Course Modules completed after the due date will not be graded, and partially complete WHMIS Course Modules and any WHMIS Course Modules that are complete but have not properly submitted the WHMIS Completion Certificate via Microsoft Forms 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 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.

**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:

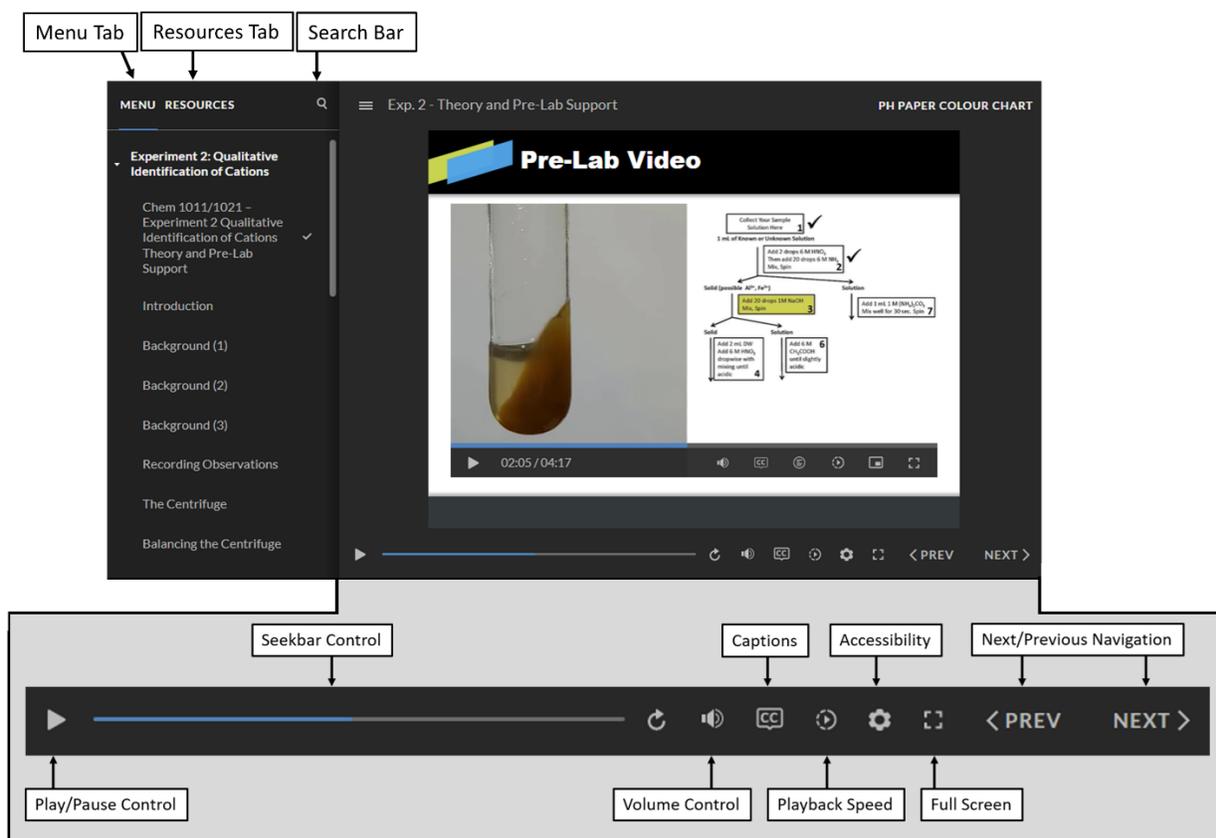
- Date
- Title of Experiment
- Data Tables and Observations from Raw Data Sheet. *If the experiment does not have a Raw Data Sheet, please use the Grade Sheet in your lab manual as a guide to prepare your lab notebook.*

**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, links to the CAPA pre-lab assignment site, and any required Microsoft Form submission links).

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, play 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**.

Sect.	Exp. 1	Exp. 2	Exp. 3	Exp. 4	Exp. 5	Exp. 6	Exp. 7
A/B	Wed., May 8 9-10:30 am	Thurs., May 9 9 am-12 pm	Mon., May 13 9-10:30 am	Wed., May 15 9 am-12 pm	Fri., May 17 9-10:30 am	Wed., May 22 9 am-12 pm	Fri., May 24 9-10:30 am
C	Wed., May 8 10:30 am-12 pm	Fri., May 10 9 am-12pm	Mon., May 13 10:30 am-12 pm	Thurs., May 16 9 am-12 pm	Fri., May 17 10:30 am-12 pm	Thurs., May 23 9 am-12 pm	Fri., May 24 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 – 2024 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.

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%.**

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 8, 2024 at 9:00 AM, their pre-lab would be due on May 8, 2024 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
<b>A/B</b>	May 9 9 am	May 9 12 pm	May 15 9 am	May 17 9 am	May 17 10:30 am	May 24 9 am	May 24 10:30 am
<b>C</b>	May 10 9 am	May 10 12pm	May 16 9 am	May 17 10:30 am	May 17 12 pm	May 24 10:30 am	May 24 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 %
<b>Total:</b>	<b>15%</b>

### 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

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. C)	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	May 9	May 9	May 13 <i>before 9am</i>
2	May 10	May 13	<i>In-lab submission only</i>
3	May 15	May 15	May 17 <i>before 9am</i>
4	May 16	May 17	May 22 <i>before 9am</i>
5	May 22	May 22	<i>In-lab submission only</i>
6	May 23	May 24	May 27 <i>before 9am</i>
7	May 24	May 24	<i>In-lab submission only</i>

**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 2024 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 2024, Summer 2025 and Fall 2025. 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](mailto:chemlab@dal.ca)) prior to the term add/drop date in order 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:

	<b>Monday</b> <i>May 6</i>	<b>Tuesday</b> <i>May 7</i>	<b>Wednesday</b> <i>May 8</i>	<b>Thursday</b> <i>May 9</i>	<b>Friday</b> <i>May 10</i>	
<b>Concept Room</b>	3:30 – 4:30pm Sam	10:30 – 11:30am Joe 3:30 – 4:30pm Sam	3:30 – 4:30pm Sam	10:30 – 11:30am Joe 3:30 – 4:30pm Sam	3:30 – 4:30pm Sam	
<b>Resource Center</b>	n/a	9 – 10:30am Gaia 10:30am – 12pm Ryan	n/a	9am – 12pm Ryan	9 – 12pm Gaia	
	<i>May 13</i>	<i>May 14</i>	<i>May 15</i>	<i>May 16</i>	<i>May 17</i>	
<b>Concept Room</b>	3:30 – 4:30pm Sam	10:30 – 11:30am Joe 3:30 – 4:30pm Sam	3:30 – 4:30pm Sam	10:30 – 11:30am Joe 3:30 – 4:30pm Sam	3:30 – 4:30pm Sam	
<b>Resource Center</b>	n/a	9 – 10:30am Gaia 10:30am – 12pm Ryan	9am – 12pm Ryan	9 – 12pm Gaia	n/a	
	<i>May 20</i>	<i>May 21</i>	<i>May 22</i>	<i>May 23</i>	<i>May 24</i>	
<b>Concept Room</b>	Holiday – No Concept Room/Resource Center	10:30 – 11:30am Joe 3:30 – 4:30pm Sam	3:30 – 4:30pm Sam	10:30 – 11:30am Joe 3:30 – 4:30pm Sam	3:30 – 4:30pm Sam	
<b>Resource Center</b>		9 – 10:30am Gaia 10:30am – 12pm Ryan	9am – 12pm Ryan	9am – 12pm Gaia	n/a	
	<i>May 27</i>	<i>May 28</i>				
<b>Concept Room</b>	3:30 – 4:30pm Sam	10:30 – 11:30am Joe				
<b>Resource Center</b>	9 – 10:30am Gaia 10:30am – 12pm Ryan	9 – 10:30am Gaia 10:30am – 12pm Ryan	<b>Sam</b> (she/her)	<b>Ryan</b> (he/him)	<b>Gaia</b> (she/her)	<b>Joe</b> (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*

$\sigma$  Bonds (Sigma Bonds)  
Hybridizing Atomic Orbitals to Make  $\sigma$  Bonds  
Unhybridized p Orbitals and  $\pi$  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 – Relative Solubilities & Limiting Reagents  
Exp. 2 – Qualitative Identification of the Cations  
Exp. 3 – Using Indicators to Distinguish Acidic, Basic, and Neutral Solutions  
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](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](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](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](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](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](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](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](https://www.dal.ca/campus_life/communities/indigenous.html)

*Black Students Advising Centre:* [https://www.dal.ca/campus\\_life/communities/black-student-advising.html](https://www.dal.ca/campus_life/communities/black-student-advising.html)

*International Centre:* [https://www.dal.ca/campus\\_life/international-centre/current-students.html](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](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](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](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](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>