

Faculty of Science Course Syllabus Fall 2022
Department of Chemistry
CHEM 4102 & 5102
Advanced Transition Metal Chemistry – 4102 &
Organotransition Metal Chemistry -5102
Fall 2022

Dalhousie University is located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq. We are all Treaty people.

We acknowledge the histories, contributions, and legacies of the African Nova Scotian people and communities who have been here for over 400 years.

Instructor(s): Mark Stradiotto mark.stradiotto@dal.ca

Lectures: 11:35-12:25 MWF LSC-Common Area C234

Course delivery: *All lectures will be available asynchronously (on-line) and students are expected to review the material on the timeline listed below and complete associated on-line quizzes. The designated in-person lecture class timeslots (MWF, as above) will be used for deeper discussions/in-class problem sets/office hours/testing; this will not be recorded. The course will be hosted on Brightspace.*

Course Description

Various themes of modern transition metal chemistry are examined, including but not restricted to: fundamental structure and bonding; spectroscopic characterization methods; as well as reactivity and reaction mechanisms.

Course Prerequisites

CHEM 3103.03 (grade of C- or better (in the case of students taking CHEM 4102.03))

Course Anti-requisites/Exclusion

CHEM 4102.03 (in the case of students taking CHEM 5102.03)

Course Objectives/Learning Outcomes

Students, upon completion of the course, should demonstrate working knowledge pertaining to:

- basic organometallic structure and bonding*
- fundamental reaction classes involving organometallic complexes*
- mechanistic organometallic chemistry and catalysis as per the material covered in the course*

Course Materials

- Provided by the instructor (there is no textbook to purchase)

Course Assessment

Component	Weight (% of final grade)	Date
Quizzes	20% total (1% x 20 quizzes)	due each Thursday after the posted lecture
Tests	80% (20% x 4-50 min tests)	on-campus, in-class (on October 67, November 4, November 16, and December 5)

Course Schedule

L# = posted lecture number (recorded for viewing on-line, asynchronously). For each posted lecture an **accompanying quiz worth 1% of the final grade** is posted (see below) for completion on Brightspace; quizzes are due at **5:00 pm** on the dates outlined in the schedule below. Please keep track of these deadlines. It is recommended that you complete the quizzes near to the same pace as your viewing of the lecture material, and perhaps after the associated recap lecture. Late quizzes will not be accepted.

'Recap' = face-to-face/in-class (unless otherwise mandated by the university) review/discussion with Prof. Stradiotto of the assigned lectures. Can also feature in-class group problem sets to develop a better understanding of the material (e.g., practice reaction mechanism, etc.)

'Office hours' = face-to-face/in-class (unless otherwise mandated by the university) with Prof. Stradiotto. No new material, but rather an opportunity to answer student questions and for students to interactively answer questions at the board in small groups. *There will be no other out-of-class-time office hours made available for this course.*

TEST # = face-to-face/in-class (unless otherwise mandated by the university) test run during the scheduled class time. In-class tests will be held on the following days: **October 7, November 4, November 16, December 5**. *There is no final examination for this course, nor will extra credit materials be provided.*

September

7 Intro discussion of syllabus, style of class and review schedule

9 L1,2; office hours

12 recap L1

14 recap L2

16 L3,4; office hours

19 recap L3,4

21 No class (MS away to give a chemistry lecture)

23 L5,6; office hours

26 recap L4,5

28 recap L5,6

30 L7,8; Quizzes 1-4 due today 5pm; University closed

October

3 Office hours (any material including for TEST 1)

5 Office hours in preparation of TEST 1

7 TEST 1, Lectures 1-4

10 University Closed

12 L9,10; recap L7-8

14 recap L9-10

17 L11,12; Quizzes 5-10 due today 5pm; office hours

19 recap L11

21 recap L12

24 L13,14 (it is suggested that you also look ahead and view L15 as I will recap early); office hours

26 recap L13-14

28 recap L14-15

31 L15,16; office hours

November

2 Office hours in preparation of TEST 2; Quizzes 11-15 due today 5pm

4 TEST 2, Lectures 5-10

7 Study break

9 Study break

11 Study break (University closed)

14 Office hours in preparation of TEST 3

16 TEST 3, Lectures 11-15

18 L17,18; office hours

21 recap L16-18

23 recap L16-18

25 L19,20 (last lecture assignments); office hours

28 recap L19

30 recap L20; Quizzes 16-20 due today 5pm

December

2 Office hours in preparation of TEST 4

5 TEST 4, Lectures 16-20

7 LAST CLASS - monday schedule (no scheduled content, can use as needed)

CHEM 4102: Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

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

CHEM 5102: Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale (where a grade of at least B- must be obtained):

A+ (90-100)	B+ (77-79)	F (< 70)
A (85-89)	B (73-76)	
A- (80-84)	B- (70-72)	

Course Policies

Normally there would be no make-up opportunity for missed quizzes. Student Declaration of Absence forms should be used for missed tests. Missed tests will be made up promptly at a date that is mutually agreeable to the student and the instructor. Sick notes are not required. It is

expected that you complete all of the testing components (quizzes and tests) independently and not collaboratively.

Course Content

The impact of organometallic transition metal chemistry on the evolution of modern synthetic chemistry practices has been profound in recent years, as evidenced by the awarding of the Nobel Prize for Chemistry in 2001, 2005, and 2010 on this topic. This advanced class seeks to develop a fundamental understanding of such chemistry, as well as to highlight fundamental and applied aspects of organometallic reactivity. As such, this advanced class in organometallic chemistry will address a range of topics including structure and bonding models, reactivity and mechanism, and applications in synthetic chemistry. Students are responsible for all material covered in the lectures, including any handouts, as well as the assigned readings. While there is no formal textbook for the course, students are encouraged to consult advanced texts covering the topics of inquiry, as well as to address the self-study problems that will be provided. Students are encouraged to review in detail the material covered in the past inorganic chemistry courses.

Assumed Background for this course includes ALL material covered in Chemistry 2101 and 3103, for example: polyhedral geometries and isomerism; basic molecular orbital theory; symmetry; and the basics of d-block coordination chemistry. Students should also have the main group and transition elements of the periodic table memorized (you will need it for exams, etc.).

Suggested Texts (especially for background reading):

“The Organometallic Chemistry of the Transition Metals” by Crabtree.

“Inorganic Chemistry” by Miessler, Fischer and Tarr.

Faculty of Science Course Syllabus (Section B) (revised April-2022)**Fall 2022****CHEM 4102/5102****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)

<https://academiccalendar.dal.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=117&chapterid=-1&topicgroupid=31821&loaduseredits=False>

University Grading Practices

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

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/undergrad-students/degree-planning.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.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: <https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html>

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