CHEM 325 COURSE OUTLINE – Organic Chemistry IV (Winter 2026)

1. General Information

- Organic Chemistry IV Structure & Stereochemistry (CHEM 325)
  3 credits, **Winter 2026, Section 52**.
- **Thursday 6:00 PM – 8:45 PM, CC-115 LOY**.
- Professor Louis Cuccia, Faculty of Arts & Science,
  Department of Chemistry & Biochemistry. Office: SP-275-17
  Email: CHEM.325@concordia.ca
  Office hours: Thursday 4:00-5:00 or by appointment (please provide multiple availabilities)
- Course web page available on Moodle (www.myconcordia.ca)
- *General comments on* CHEM 325:

  PowerPoint presentations will be used as lecture material and the lecture presentations will be available to you online on Moodle.

  DO NOT FALL BEHIND IN UNDERSTANDING THE COURSE MATERIAL. The material cannot be mastered the week before a test. There are many good books and internet resources available to help you to understand specific topics in organic stereochemistry. Please feel free to come and see me if you have any problems regarding the course material.

Course Description Organic Chemistry IV - Structure & Stereochemistry

- Introduction to molecular symmetry. Organic structure and stereochemistry including the relationship of stereochemistry to physical properties and chemical reactivity. Determination of organic structure and stereochemistry by chemical and spectroscopic means.
- Prerequisites: CHEM 221 & CHEM 222
- *Course Topics:*
  - Stereochemistry → background & history.
  - Identifying and classifying stereoisomers (chirality, symmetry elements, stereogenic units and space groups).
  - Molecular origin of stereoisomerism → configuration/conformation/topology.
  - Nomenclature.
  - Measuring enantiomeric purity & resolution.
  - Determining absolute configuration.
  - Enantiopure compound synthesis and prochiral elements.
  - Diastereoselective, stereoselective, and symmetry-controlled reactions.
  - Stereochemistry in biology & chiral drugs.
  - Allotropes, supramolecular chirality and 2D self-assembly.
  - Chiral crystals & the origin of homochirality.
  - Proteins & foldamers.
  - 2D chirality.
  - Chiral-induced spin selectivity (CISS) Effect.

2. Objectives

Upon successful completion of CHEM 325, students should demonstrate an understanding of advanced concepts in stereochemistry and their applications. *Students are expected to apply this knowledge towards solving problems in organic stereochemistry.*

3. Schedule (may be subject to change)

Examinations & problem sets:

There are TWO midterm tests (tentative dates: **Thursday. Feb. 12, 2026** & **Thursday. March 26, 2026**) and a take-home crystal growing lab exam/report. **There are no make-up tests.** The final exam date will be arranged by the Concordia University Examinations Office. It is your responsibility to take note of the time and date of the final exam. There are no graded assignments, and problem sets will be provided.

Laboratory information:

Laboratory performance is graded on the quality of the experimental work and the laboratory reports. The laboratory coordinator is Ms Rita Umbrasas (L-SP 330-01; rita.umbrasas@concordia.ca) and the CHEM 325 laboratories are located at L-SP 112. Laboratories start the week of **Jan. 19, 2026**. All students *must* attend the lab section for which they are registered. If you are repeating the course and have passed the lab component within the past two (2) years, you may request a lab exemption. Applications for the exemption must be completed by the end of the first week of term no later than 4:00 PM on **Fri., Jan. 16, 2026**, must be returned to Lisa Montesano (chemistry.reception@concordia.ca; late applications will not be accepted; *https://www.concordia.ca/artsci/chemistry/programs/undergraduate/procedures-forms.html)*. You must register for the appropriate lab exemption section (56); if you are registered in any other lab section, you will be required to complete the lab portion of the course. If you apply late or are denied an exemption, you must repeat the lab portion. If an exemption is granted, your previous lab mark (lab reports and lab exam) will be carried forward. A student who is denied a lab exemption must repeat the laboratory component of the course. Students receiving a DISC grade in this course will be required to repeat all components of the course if they retake it (*i.e.,* no possibility of a lab exemption).

4. Private 325 tutor: Ming Tam (kwanming.tam@mail.concordia.ca)

5. Lab Schedule – Winter 2026

Date	Experiment	Title
Week of Jan. 19	2	Computational study of the addition of Br_2 to cycloalkenes
Week of Jan. 26	1	Check-in & Stereochemistry of the addition of bromine to cinnamic acid
Week of Feb. 2	3	Stereoisomers of α-bromocinnamic acid
Week of Feb. 9	4 Part A (*week #1*)	Chiral crystallization of ethylenediammonium sulfate
	4 Part B (*week #1*)	Dying of potassium dihydrogen phosphate with amaranth
Week of Feb. 16	4 Part A (*week #2*)	Chiral crystallization of ethylenediammonium sulfate
	4 Part B (*week #2*)	Dying of potassium dihydrogen phosphate with amaranth
	6 (*week #1*)	Enantioselective aldol condensation
Week of Feb. 23	6 (*week #2*)	Enantioselective aldol condensation
March 2 - 8	***READING WEEK***	
Week of March 9	5 Part A/B	Stereochemistry of the sodium borohydride reduction of benzoin
Week of March 16	7 Part A/B	Stereochemistry & molecular rearrangement in bicyclic systems
Week of March 23	8	Computational study of the elimination of H_2O from borneol

6. Course Materials

- Concordia CHEM325 Organic Chemistry IV Laboratory Manual (available on the Course lab Moodle page).
- **Lab coats** and **safety glasses** are compulsory during the practical laboratories and are available from the Concordia University bookstore.
- **Molecular models** help considerably in clarifying certain points in organic stereochemistry theory. They are permitted for exams and you are strongly advised to buy, borrow, or share a set.
- Reference material at the Vanier Library: Guide to Organic Stereochemistry (S.R. Buxton & S.M. Roberts - 1996); Stereochemistry of Organic Compounds (Eliel - 1994); Basic Organic Stereochemistry (Eliel - 2001); Stereochemistry (Morris - 2001); Organic Stereochemistry (Robinson - 2000). Stereochemistry workbook : 191 problems and solutions (*https://concordiauniversity.on.worldcat.org/search/detail/262692695?queryString=problems%20stereochemistry&databaseList=*)

- Online reference material:

http://www.iupac.org/publications/pac/1996/pdf/6812x2193.pdf
https://onlinelibrary.wiley.com/doi/abs/10.1002/hlca.201200469
https://openstax.org/books/organic-chemistry/pages/dedication-and-preface

Grading

Midterm tests:	35%
Final exam (arranged by the Examinations Office):	40%
Laboratory:	15%
Take-home crystal growing lab exercise (crystals & report)	10%
TOTAL:	**100%**

Students must pass the lecture material and lab component SEPARATELY - Minimum passing marks: 50% lecture and 60% lab (within the lab mark the minimum passing grade for both the lab reports and the lab exam/prelab questions is 50%). The passing mark for the lab exam is 50% - You will receive an R (repeat) should your lab exam be below 50%. **STUDENTS MUST PASS THE FINAL EXAM TO PASS THE COURSE**. Grading scale: 0 F; 50.0 D-; 53.3 D; 56.6 D+; 59.9 C-; 62.2 C; 65.5 C+; 68.8 B-; 72.1 B; 75.4 B+; 78.7 A-; 83 A; 90 A+.

In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change. The class format is in-person, but subject to change given the evolving COVID-19 situation at Concordia.
Course withdrawal: Students who wish to withdraw from a course must do so before the deadline (**Mon. March 23, 2026**) is the last day for academic withdrawal (DISC) from winter-term courses) Students who withdraw from this course must *also check-out from their lab section.* A student who does not properly withdraw before the specified deadlines will receive a failing grade. A student who is denied a lab exemption must repeat the laboratory component of the course. Please note that anyone who discontinues this class (DISC) is NOT eligible for a lab exemption (effective Winter 2024).

7. Rights and Responsibilities

Source: https://www.concordia.ca/conduct/academic-integrity/plagiarism.html

Plagiarism:

The most common offense under the Academic Code of Conduct is plagiarism which the Code defines as, *"the presentation of the work of another person as one's own or without proper acknowledgement."*

This could be material copied word for word from books, journals, internet sites, professor's course notes, *etc.*. It could be material that is paraphrased but closely resembles the original source. It could be the work of a fellow student, for example, an answer on a quiz, data for a lab report, a paper or assignment completed by another student. It might be a paper purchased through one of the many available sources. Plagiarism does not refer to words alone - it can also refer to copying images, graphs, tables, and ideas. Plagiarism can also apply to oral presentations, computer assignments and artistic works. Finally, if you translate the work of another person into French or English and do not cite the source, this is also plagiarism.

Promoting Academic Integrity: It is imperative to maintain the principles of academic integrity when using generative Artificial Intelligence (AI). Students should clearly attribute AI-generated content in their lab reports, distinguishing between their original work and the contributions made by the AI system. This transparency ensures that academic credit is given where it is due.
DO NOT COPY, PARAPHRASE OR TRANSLATE ANYTHING FROM ANYWHERE WITHOUT SAYING FROM WHERE YOU OBTAINED IT!

"CHEM 101": The Academic Code of Conduct: Ethical Use of Information Sources

MANDATORY QUIZ AND SEMINAR

As part of your CHEM course, you are required to i) attend a Chemistry and Biochemistry Departmental Seminar on the academic conduct code and the appropriate use of information sources and ii) pass the online quiz associated with this seminar (the passing grade for the quiz is 100%). (Note: this quiz is graded by the Department of Chemistry and Biochemistry, and you do not have access to it until after you have attended the seminar. Therefore, any other quiz you may have taken on the academic code of conduct does not count toward the CHEM 101 requirement.) The aim of this seminar and quiz is to clarify the academic conduct code in terms of which practices will be considered unacceptable with regards to work submitted for grading in your CHEM course. You are only exempt from repeating the seminar and the quiz if you have done both in Winter 2021 or more recently,* otherwise you are required to repeat both this term. This short seminar (1 hour) will be held at the following times (note that you will not be given credit if you join too late and/or leave too early):

Date (Winter 2025)	Time	Mode	Registration link
Jan. 27 (Tuesday)	21:00-22:00	Zoom	https://concordia-ca.zoom.us/meeting/register/abB53MlnQSC6LrNsCnRepw
Jan. 29 (Thursday)	21:00-22:00	Zoom	https://concordia-ca.zoom.us/meeting/register/0v3k0gZLTgGLTXRYpNJ7zg

As space for each of the Zoom seminars is limited, please register early for your preferred slot (copy the corresponding link above into your browser). Look out for the Zoom email with the link to the actual seminar. Then do not forget to attend that seminar slot on the date above. You will not receive a reminder on or before the date! We will take attendance at the Zoom seminar; this means that you must log in with the code that was supplied for your registration. Do not "join a friend" in watching at their computer.

If you do not complete this course requirement, your final grade for the course may be lowered by one full letter grade with an incomplete (INC) notation until such time as this requirement is completed. Please refer to the undergraduate calendar (section 16.3.5) for details on removal of an incomplete notation.

***** You are exempt if you can locate your ID in the pdf file located here: (http://www.concordia.ca/content/dam/artsci/chemistry/docs/Compliance-list.pdf) and if there is no entry in the "quiz" column for you. If the list does not say "Winter 2020-Fall 2024", you have the wrong list: clear your browser data.

ChatGPT & Generative AI:

"[T]o take full advantage of AI in your learning or work, you still need to understand your subject matter well enough that you can both guide the tool as well as critically assess its output. This means that generative AI tools like ChatGPT cannot replace the necessity of developing your own knowledge on a subject and exercising deep critical thinking skills." Or as stated very eloquently by my nephew, "ChatGPT makes you stupid".

https://library.concordia.ca/apps/things/thing.html?thingID=22032

8. Improving Your Academic Experience

The University offers many services that can help students:

Concordia Student Hub - *https://www.concordia.ca/students/services.html*

Concordia Counseling and Development offers career services, psychological services, student learning services, *etc.* - *https://www.concordia.ca/health/mental-health/counselling.html*

The Concordia Library Citation and Style Guides - *http://library.concordia.ca/help/howto/citations.html*

Advocacy and Support Services - *https://www.concordia.ca/offices/advocacy.html*

Students with Disabilities - *http://www.concordia.ca/students/accessibility.html*

Student Success Centre - *http://www.concordia.ca/students/success.html*

Financial Aid & Awards - *https://www.concordia.ca/artsci/students/financial-aid.html*

Health Services - *https://www.concordia.ca/health/medical/clinic.html*

Sexual Assault Resource Centre - *https://www.concordia.ca/conduct/sexual-assault.html*

Concordia Graduate Programs - *https://www.concordia.ca/academics/graduate.html*

Concordia Legal Services - https://www.concordia.ca/about/administration-governance/legal.html