Chemistry 2223B
ORGANIC CHEMISTRY OF BIOLOGICAL MOLECULES
Winter 2025–26

Course Outline

1. Course Information

Prerequisite(s)

To ensure that a minimum level of preparation has been attained, Chem 2213A/B or 2283G is required as a prerequisite. Chem 2273A alone, in the absence of Chem 2283G, is inadequate preparation and therefore not a suitable prerequisite. This course does not have any antirequisites.

Unless you have either the prerequisites for this course or written special permission from the Department of Chemistry to enroll in it, you may be removed and withdrawn from this course in accordance with university policy. This may be done after the add/drop deadline of the academic term, and the course will be marked as withdrawn (WDN) on your academic record. This decision may not be appealed.

Students repeating the course must repeat the lab component. There are no exemptions.

Key Dates

Date	Event
Monday, January 19	First week of lab rotations. Your first lab may be this week or the following week. Please refer to the lab schedule.
Saturday, February 7, 2:00–4:00 PM	Test #1
Saturday, March 14, 2:00–4:00 PM	Test #2
Monday, March 30 (“Drop deadline”)	Last day to drop the course without academic penalty. If you drop the course on or before this date, it will be shown on your academic record as WDN (withdrawn). Dropping after this date will result in a WDF, which counts as an F.

2. Instructor Information

Throughout the term, your course instructors, a lab coordinator, and many teaching assistants contribute to the course. They are here to support your learning and help you achieve your goals. Your instructor's information can be found below.

Email should only be used for administrative purposes. Emails are triaged during regular business hours and answered in the order of importance. To allow the Chem 2223B team to respond to administrative concerns as quickly as possible, please do not send emails containing:

- Questions about course material or on how to do a particular problem in the workbook. Such questions should be taken to the Resource Room or posted on the OWL forum.
- Questions that can be answered based on the information found in this course outline.
- Requests for grade increases, extra assignments, make-up labs, or similar.

If you email us, you **must use your Western email address and include *Chem 2223B* in the subject line**. Messages from a non-Western account or those that do not include *Chem 2223B* may be blocked by the university's anti-spam system. Including your student number would be useful.

Constructive feedback is valuable to us. Please do not hesitate to contact us if you have any comments or feedback on any aspect of Chem 2223B. We are always trying to improve the course so that we can improve your experience!

3. Course Description, Delivery, Topics, Learning Outcomes

Official Course Description from Academic Calendar

An examination of the chemistry of naturally occurring molecules, emphasizing organic compounds of importance in the Biological and Health Sciences.

Delivery

This course is fully in-person (online lectures or labs are not available). The course meets for 3 lecture hours per week and 3 laboratory hours every other week.

Course Topics

Topic	Approx # of Classes
Colours and Chromophores Photophysical processes, UV/visible absorption spectroscopy, fluorescence spectroscopy	3
Cellular Structure and Function (examinable self-study section) Brief overview of components, organelles, and function	0
Amino Acids and Proteins Acid-base properties, protein structure, composition and sequence analyses, Edman degradation, laboratory peptide synthesis, enzymes, biosynthesis of proteins	9
Carbohydrates Stereochemistry, reactions of functional groups, properties of di- and polysaccharides, mechanisms of glycolytic reactions, connection between pyruvate and amino acids	8
Lipids Properties, biosynthesis and beta-oxidation of fatty acids, synthesis of soaps and detergents, biosynthesis of terpenes, phospholipids, fat-soluble vitamins	7
Nucleic Acids Structure and properties, DNA sequencing, laboratory DNA synthesis, carcinogens	3
Pharmaceutical Drugs Sources of pharmaceutical drugs, approval process, sulfanilamide, PDT	3

Learning Outcomes

Chem 2223B has an emphasis on the development of skills such as critical thinking, problem solving, and scientific reasoning; these transversal skills are essential to success in not just chemistry but also in other courses and in many occupations. A student receiving credit for Chem 2223B will be expected to reliably demonstrate competence in their ability to:

Discipline-Specific Expectations

- Describe the importance of organic chemistry in everyday life and the interdisciplinary nature of organic chemistry.
- Use critical thinking skills to explain, make connections between, and apply chemical principles, laws, and theories that pertain to the chemistry of living systems.
- Evaluate and assess chemical data and information and explain how they relate to chemical theories/laws.
- Apply chemical theories or laws to solve a variety of novel chemical problems.
- Conduct experiments and draw conclusions from collected experimental data and results.
- Safely use a variety of laboratory equipment and instrumentation to perform experimental procedures and explain the underlying theory behind all of them.

Professional-Skill Expectations

- Analyze and critically assess problems, and take a systematic approach to solve them.
- Work independently, as well as with others in an effective, practical, social, and ethical manner.
- Obtain, evaluate, and integrate information from various sources, and determine its relevance.
- Prioritize tasks and manage the use of time.
- Execute mathematical calculations accurately.
- Communicate thoughts, ideas, and observations verbally and in writing.
- Recognize when to seek assistance.
- Develop respect for, and comply with, regulations and policies.
- Accept responsibility for their decisions, actions, and inactions.

4. Course Materials

Textbook and Other Learning Materials

Chemistry 2223B Lab Manual, Practice Problems, and Sample Tests & Exams

- The 2025–26 edition is required. Second-hand or old editions cannot be used. Students repeating the course will require a new lab manual. Photocopies are not accepted. The lab manual must be purchased from the bookstore, and the cost of this item can be found at https://bookstore.uwo.ca/product/9781533978929.

No official textbook

- This course does not use a textbook, but many students will find their Chem 2213A or 2283G textbook (*Organic Chemistry* by Klein, any edition) to be a useful reference.

Proper lab attire

- An appropriate lab coat, safety glasses, shoes, socks, and pants are required. Please see the lab manual for further details.

Molecular model kit, by Darling Models

- Other model kits may be used, but we highly recommend this kit for its ease of use.

Students are responsible for checking the course OWL site (https://westernu.brightspace.com) regularly for news, updates, and relevant materials. This is the primary method by which information will be disseminated to all students in the class.

If students need assistance with the course OWL site, they can seek support on the OWL Brightspace Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

5. Laboratory Information

For each experiment, watch any provided technique videos that may be on OWL and complete the prelab quiz before the start of your scheduled laboratory session, which is determined by your section of registration. The videos and the prelab quiz will be released at least one week prior to your scheduled laboratory session. The prelab quizzes are worth 20% of each laboratory and cannot be taken until after the prelab videos have been viewed.

In-person labs are located in Chemistry Building 111 and 112. These rooms are on the first floor of the Chemistry Building. You must attend the section in which you are registered and be in your assigned room. Your room will be assigned when you arrive for your first experiment.

Experiment	Odd-Numbered Lab Sections	Even-Numbered Lab Sections
1. TLC Analysis	Week of January 19	Week of January 26
2. Amino Acids and Proteins	Week of February 2	Week of February 9
3. Carbohydrates	Week of February 23	Week of March 2
4. Fats, Oils, Soaps, and Detergents	Week of March 9	Week of March 16
5. Synthesis of Zyban	Week of March 23	Week of March 30

6. Learning Support and Resources

OWL Discussions

The forums on OWL provide an engaging venue for students to collaboratively discuss course concepts. Course TAs will be participating in the discussions.

Chemistry Resource Room

The Chemistry Resource Room (both in-person and virtual) provides you with an informal environment for you to ask questions related to lecture material and obtain assistance on practice problems. Group work and peer-to-peer support are strongly encouraged.

Instructors' Student Hours

Course instructors have student hours (office hours) that can be scheduled by appointment. Each course instructor supports many students, so please note that these hours are set aside for concerns (e.g., learning strategies, personal matters, etc.) that cannot be addressed through the OWL forums or the Resource Room.

Learning Development & Success

Learning-skills professionals at LDS (https://learning.uwo.ca/) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling. LDS also runs a Peer Assisted Learning Centre.

Tutors

Private, third-party review or tutor services are not affiliated with, or endorsed by Western. As such, the university cannot be responsible for any of the content they provide, even if the content causes you to answer exam questions incorrectly. Because of liability reasons, your instructors are not permitted to suggest or recommend any specific tutors.

Students should realize that they may not hire tutors who are Chem 2223B teaching assistants, even if they are not from your own lab section. This is a serious legal matter pertaining to conflict of interest.

7. Methods of Evaluation

Grading Scheme and Assessment Dates

Your overall course grade out of 100 will automatically be the higher of the grades calculated by the two methods shown below using the respective component weights. If your Final Exam percent mark is higher than your lower-scoring test, your lower-scoring test won't count.

Component	Notes	Method 1	Method 2
Laboratory	Five experiments × 4.00 each	20	same
Term Tests	[redacted]		
	Higher-scoring test based on percentage	28	same
	Lower-scoring test based on percentage	7	0
Final Exam	Scheduled by the Registrar, 3.00 hours	45	52

Essential Learning Requirements

To obtain credit for the course, all three requirements below must be met:

1. Obtain a minimum of 50% on the overall course grade.
2. Obtain a minimum of 50% on the laboratory component (10.00 out of 20). This mark is calculated from all five experiments. A missed experiment is assigned a mark of zero unless it has been "excused."
3. Perform at least three experiments (no more than two of the five can be "excused").

Students who fail to meet requirement #2 or #3 will receive a course grade no greater than 40% (even if the calculated course grade is higher) and will not receive credit for the course.

Equal Opportunity and Evaluation Policy

We are here to help you attain your goals and want you to do well. We understand the importance of course grades and the hard work that you will invest into this course.

Most importantly, we also have to be fair. The university is committed to academic integrity and has high ethical and moral standards. All students will be treated equally and evaluated using the criteria presented in this course outline and their respective weights. The evaluation criteria are based strictly on actual achievement, not on effort or how hard the student tried. Claims of an excellent academic history, of attendance in the course components, or of personal issues (family, relationship, financial, etc.) cannot be used to justify a higher grade in the course because they are not criteria for evaluation. There is no extra work available for extra credit or to "make up" another grade. We do not offer any extra assignments, essays, experiments, or other work of any kind to any student.

The requirement for a higher grade in order to, for example, maintain a scholarship, enter a program, or obtain a higher GPA for various reasons, is not a justifiable reason for increasing your grade. If we increased or "bumped" your grade (gave you a grade that you did not legitimately earn), it would be unfair to the other students and also a great disservice to the scholarships and programs who are evaluating all students on the basis of their grades. Please do not ask us for a grade increase.

General information about missed coursework

Your instructors realize that occasionally, students may experience an extenuating circumstance of significant severity (such as illness or injury) that temporarily renders them unable to meet academic requirements.

Students must familiarize themselves with the *University Policy on Academic Consideration – Undergraduate Students in First Entry Programs,* posted on the Academic Calendar: https://uwo.ca/univsec//pdf/academic_policies/appeals/academic_consideration_Sep24.pdf

This policy does not apply to requests for Academic Consideration submitted for **attempted or completed work**, whether online or in person.

The policy also does not apply to students experiencing longer-term impacts on their academic responsibilities. These students should consult Accessible Education.

For procedures on how to submit Academic Consideration requests, please see the information posted on the Office of the Registrar's webpage: https://registrar.uwo.ca/academics/academic_considerations/

All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline.

All requests for academic consideration must be made within 48 hours after the assessment date or submission deadline.

- If you are a Science or Basic Medical Sciences student, information on academic considerations (as well as adding/dropping courses, appeals, exam conflicts, and many other academic-related matters) can be found at: website: https://www.uwo.ca/sci/counselling/

All academic consideration requests must include supporting documentation; however, recognizing that formal documentation may not be available in some extenuating circumstances, the policy allows students to make *one* academic consideration request without supporting documentation in this course.

However, the following assessments are excluded from this, and therefore always require formal supporting documentation:

- Test #1 and Test #2, when *both* are missed
- Final Exam

When a student *mistakenly* submits their one allowed academic consideration request without supporting documentation for the assessments listed above or those in the coursework with built-in flexibility below, the request cannot be recalled and reapplied. This privilege is forfeited.

Because the following components already have built-in flexibility, academic consideration requests will be denied for:

- First missed test (Test #1 *or* Test #2; evaluation Method 2 applies)

However, the course offers additional academic consideration: students who miss *both* Test #1 and Test #2 may provide documentation to request academic consideration, and when granted, the weight of the tests will be shifted to the Final Exam.

A summary of the procedures for the different course components is as follows.

Missed Lab Session

Step 1 **There are no make-up labs, nor is it possible to reschedule a lab.**

Obtain academic consideration.

Anything else? No. After obtaining academic consideration, please **do not** contact your instructor or lab coordinator even though you may be asked to do so. We will be automatically notified of the academic consideration.

What happens? The missed lab will be "excused" and its weight will be distributed over all of the other labs. There are no online alternatives available.

If academic consideration was not obtained or granted, the missed lab will be given a mark of zero.

Tests and exams will contain questions related to the theoretical aspects of the experiments. You are still responsible for the material pertaining to the missed labs.

Good to know! Even with academic consideration, you must miss no more than two experiments in order to be eligible to pass the course.

Missed Test #1 and/or Test #2

There are no make-up tests. The procedure depends on whether you miss one or both tests.

Missed one of Test #1 or Test #2

What happens? According to Method 1 of the evaluation scheme, the higher-scoring test is worth 28, and the lower-scoring test is worth 7. A missed test is assigned a mark of zero, so the missed test is the lower-scoring test. Therefore, calculation Method 2 will apply if you miss one test. This is done automatically. There is no need to contact us or take any additional steps.

Academic consideration is neither required nor accepted.

Missed Both Test #1 and Test #2

Step 1 Obtain academic consideration. **Supporting documentation that covers the date of Test #2, March 14, is required.**

Anything else? Nope! After obtaining academic consideration, please do not contact us even though you may be asked to do so. We will be

automatically notified of the academic consideration after it has been processed.

What happens? The weight of the tests will be transferred to the Final Exam.

Missed Final Exam

Step 1 Obtain academic consideration. **Supporting documentation is required.**

Anything else? No. After obtaining academic consideration, please do not contact us even though you may be asked to do so. We will be automatically notified of the academic consideration after it has been processed.

What happens? If academic consideration is granted, you will be allowed to write the Special Examination (the name given by the University to a makeup Final Exam). See the Academic Calendar for details (under Special Examinations), especially if you miss multiple final exams within one examination period.

If you miss the Special Exam, you will need to obtain academic consideration again. If it is granted, the date of the next Special Exam will normally be the scheduled date for the Final Exam the next time this course is offered. The maximum course load for the term in which the Special Exam is granted will be reduced accordingly.

Good to know! You may also be able to write the Special Exam if you are in a "Multiple Exam Situation."

https://registrar.uwo.ca/academics/examinations/exam_conflicts.html

8. Additional Statements

8.1 Religious Accommodation

When a recognized religious holiday or observance conflicts with an examination, test, or other scheduled academic obligation, students must request accommodation via the Student Absence Portal (SAP). This request should identify the conflict and specify which course component(s) (e.g. test, midterm, exam) are affected.

Students are encouraged to submit the SAP request as early as possible, but no later than two weeks before any examination, or one week before any midterm test or quiz, to allow sufficient time for adjustment.

The SAP request serves as official notification to both the course instructor and the Academic Advising Office, in accordance with university policy:
https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

For more information on recognized religious holidays, please visit the Diversity Calendar posted on the Equity, Diversity & Inclusion website: https://www.edi.uwo.ca

8.2 Academic Accommodation Policies

Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities is at:
https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic Accommodation_disabilities.pdf

8.3 General Academic Policies

The website for Registrar Services is https://www.registrar.uwo.ca/

Use of @uwo.ca email

In accordance with policy, https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf, the centrally administered email account provided to students will be considered the individual's official university email address. It is the responsibility of the account holder to ensure that emails received from the University at their official university address are attended to in a timely manner.

Requests for Relief (formerly known as "appeals")

Policy on Request for Relief from Academic Decision:
https://uwo.ca/univsec//pdf/academic_policies/appeals/requests_for_relief_from_academic_decisions.pdf

Procedures on Request for Relief from Academic Decision (Undergraduate):
https://uwo.ca/univsec//pdf/academic_policies/appeals/undergrad_requests_for_relief_procedure.pdf

8.4 Scholastic Offences

Policy on Scholastic Offences:
https://uwo.ca/univsec//pdf/academic_policies/appeals/scholastic_offences.pdf

Procedures on Scholastic Offences (Undergraduate):
https://uwo.ca/univsec//pdf/academic_policies/appeals/undergrad_scholastic_offence_procedure.pdf

Use of Electronic Devices During Assessments

In courses offered by the Faculty of Science, the possession of unauthorized electronic devices during any in-person assessment (such as tests, midterms, and final examinations) is strictly prohibited. This includes, but is not limited to: mobile phones, smart watches, smart glasses, and wireless earbuds or headphones.

Unless explicitly stated otherwise in advance by the instructor, the presence of any such device at your desk, on your person, or within reach during an assessment will be treated as a scholastic offence, even if the device is not in use.

Only devices expressly permitted by the instructor (e.g., non-programmable calculators) may be brought into the assessment room. It is your responsibility to review and comply with these expectations.

Use of Generative AI Tools

Unless otherwise stated, the use of generative AI tools (e.g., ChatGPT, Microsoft Copilot, Google Gemini, or similar platforms) is **not permitted** in the completion of any course assessments, including but not limited to: assignments, lab reports, presentations, tests, and final examinations. Using such tools for content generation, code writing, problem solving, translation, or summarization—when not explicitly allowed—will be treated as a **scholastic offence**. If the use of generative AI is permitted for a particular assessment, the conditions of use will be specified by the instructor in advance. If no such permission is granted, students must assume that use is prohibited. It is your responsibility to seek clarification before using any AI tools in academic work.

Cheating Analysis

Computer-marked multiple-choice tests and exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

8.5 Support Services

Please visit the Science & Basic Medical Sciences Academic Advising webpage for information on adding/dropping courses, academic considerations for absences, requests for relief, exam conflicts, and many other academic-related matters: https://www.uwo.ca/sci/counselling/

Students who are in emotional/mental distress should refer to Mental Health@Western (https://uwo.ca/health/) for a complete list of options about how to obtain help.

Additional student-run support services are offered by the USC: https://westernusc.ca/services/

This course is supported by the Science Student Donation Fund. If you are a student registered in the Faculty of Science or the Schulich School of Medicine and Dentistry, you pay the Science Student Donation Fee. This fee contributes to the Science Student Donation Fund, which is administered by the Science Students' Council (SSC). One or more grants from the Fund have allowed for the purchase of equipment integral to teaching this course. You may opt out of the Fee by the end of September of each academic year by completing the online form linked from the Faculty of Science's Academic Advising site. For further information on the process of awarding grants from the Fund or how these grants have benefitted undergraduate education in this course, consult the Chair of the Department or email the Science Students' Council at ssc@uwo.ca.