



Department of Chemistry
Biochemistry I - Chem3251/Biol3252
Course ID: 167715
2025 Fall Course Outline

Instructor Information

Instructor: Dr. Justin Jiang
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Office Hours: Friday 2:00 – 3:00 pm; or by appointment

Lab Instructor Information

Lab Instructor: Christina Richard
Office: CB2028A
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Course Prerequisites: Chem2231 or equivalent

Course Description (in Course Calendar)

Chemistry and metabolism of monosaccharides, disaccharides and polysaccharides.
Chemistry of amino acids and proteins. Structure and reaction of fatty acids, triacylglycerols and phospholipids. Structure and properties of nucleotides and polynucleotides of DNA and RNA.

Course Location and Times

Class Location: RB1022
Class Time: Tuesday & Thursday 8:30 – 10:00 am

Labs This course has a laboratory component and is required for obtaining the course credit. If you are repeating this course and have obtained a passing grade for the lab component previously, you may not have to repeat the lab component. Please contact the course instructor in the first week to discuss whether you are eligible for exemption from the labs.

Location: CB2050/2051
Time: Th & Fr 2:30 – 5:30

Key Course Learning Objectives

Upon successful completion of this course, students will have reliably demonstrated the ability to:

- Describe the structural features of the four classes of biomolecules including proteins, nucleic acids, lipids and carbohydrates, and the basic roles and biological functions of these biomolecules.

- Describe the structural features and functions of biological membrane and different types of membrane transporters including carriers, pumps and channels.
- Understand the basic concepts of metabolism and explain how energy (ATP) production or consumption is associated with degradation or biosynthetic pathways.
- Describe several metabolic pathways including Glycolysis, Gluconeogenesis, Citric Acid Cycle, Oxidative Phosphorylation, Fatty Acid Metabolism and Pentose Phosphate Pathway. Describe the significance of these pathways in energy metabolism and their roles in the normal function of the cell/organism.
- Formulate reaction schemes of the key reactions in each of these metabolic pathways. Identify the enzymes catalyzing these key reactions in these pathways.
- Understand and describe how each of these pathways is controlled/regulated.
- Conduct experiments according to laboratory procedures and critically analyze experimental data.
- Develop writing skills in effectively communicating laboratory findings and literature information in the general format of a research paper.

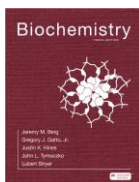
Course Resources

- **myCourseLink on D2L:** <https://mycourselink.lakeheadu.ca/d2l/home/175883>



Lecture Notes, Lab Manual, and other course materials are available on D2L.

- **Textbook:** Biochemistry (with Achieve), 10th edition, Jeremy M. Berg, Gregory J. Gatto, Jr., Justin Hines, John L. Tymoczko, and Lubert Stryer – W. H. Freeman and Company. New York, NY.



- **Achieve (Macmillan learning):** The digital textbook and online assignments of this course are supported by Macmillan Learning. The textbook is available at LU Bookstore.
 - a) ISBN: 9781319417475-"Achieve for Biochemistry (1-Term Online)"- \$124.99
 - b) ISBN: 9781319417499- "Achieve for Biochemistry (2-Term Online)"- \$186.99

The same textbook will be used for Biochemistry II (Chem3271/Biol3272-WA) in the winter of 2026. It is more cost effective to purchase the 2-term access if you plan to take Biochemistry II in the winter of 2026.

Achieve Course Info:

- Course URL: <https://achieve.macmillanlearning.com/courses/g7d3kq>
- Achieve Course ID: g7d3kq
- The course on Achieve is displayed as the following:

Course Name	Course ID	Meeting Times	Term	Institution	Term Dates
Biochemistry I (2025 Fall) Chem 3251/Biol 3252 Template: Achieve for Biochemistry	g7d3kq	TuTh 8:30 AM-10:00 ...	Fall 2025	Lakehead University	Start: Aug-31-2025 End: Dec-22-2025

Ebook Access (4-year access):

- Any student who purchases Achieve access (by itself or bundled with a physical text) will have access to the eBook for the duration of their education or four years by [following these instructions!](#)

[Achieve Student Checklist](#) - this is a 'go-to HUB' for students:

- Contains information for students including registering for your course, how to use Achieve, FAQs, tech support etc.

Tech Support Options:

- Via Online Form - available 24/7 - <https://mhe.my.site.com/macmillanlearning/s/>

Assessments

To successfully complete this course, students must achieve a passing grade of 50% or higher in the overall course and 50% or higher for the lab component. Students would not be eligible for the Special Exam if their overall grades are in the range of 40 – 49 but their lab grade is below the passing grade of 50%.

Item	Weight%
Assignments (x 8)	15
Labs	25
Midterm exam	25
Final Exam	35
Total	100

Assignments

There are eight graded online Assignments on Achieve (Macmillan Learning), which are chosen from the end-of-chapter problems from those chapters. These assignments are helpful in assisting you with learning the course materials. Each Assignment is typically open for two weeks for you to complete. The due dates of these Assignments are provided in the course outline as well as on the Achieve course website.

Due Dates:

- Grading activities carry due dates which are posted on the Course Outline/Lab Manual and/or on D2L/Achieve. It is the student's responsibility to meet these deadlines.
- Extension of a deadline may be considered at the course/lab instructor's discretion if requested prior to the deadline with justification.

Late Assignments/Lab Reports

- Late assignments will automatically receive a zero (0) mark. Students will not be able to submit any specific Assignment after the due date.
- Late lab reports will receive a penalty of mark deduction. Please refer to the Lab Manual for more information.

Exams

- There is one **midterm exam** scheduled on Thursday, **October 23, 2025**, which will be written in class. The final exam will be scheduled by the University. All exams are in principle cumulative, and all exams are in-person exams unless the University's (health) policy requires otherwise.
- **Missed Exams:** Any exam missed for compassionate or medical reasons must be justified with proper documentation, which must be provided to the instructor within two days after the exam is over. **There is no make-up exam for the missed midterm exam for this course.** The default option for the missed midterm exam is that the weight% of the missed midterm exam will be shifted to the final exam. Missed final exams will be dealt with by the Registrar's office.

Course Policies

- Attendance - Attendance to Labs is required. Attendance to Lectures is highly recommended as this is the most important way the instructor can help the students with their studies of the course materials.
- Safety regulations
 - All students attending Chemistry labs, whether in-person or online, must complete the compulsory safety/ethics modules on **myChemistry**:
 1. WHMIS with GHS
 2. Chemistry Department Safety Regulations
 3. Academic Integrity Matters

myChemistry is available on myCourselink. See the lab manual for more details and the due dates for completing these modules.

Please note that students who do not complete these modules by the deadline will be barred from further lab participation, and a grade of zero will be assigned to each missed lab report. In addition, students who miss half of the labs will receive no lab credit for the course.

- Group work/collaboration – By completing quizzes and exams, or submitting assignments and lab reports, the student has read, understands and agrees to the following Academic Integrity Statement:

I understand and agree that:

(1) Unless otherwise allowed by the course instructor, I must complete the assignments and lab reports in this course without the assistance of anyone else, and without using any content from past assignments and/or lab reports.

(2) Unless otherwise allowed by the course instructor, I must not access any sources or materials (in print, online, or in any other way) to complete any course exam.

I further understand and agree that, if I violate either of these two rules, or if I provide any false or misleading information about my completion of course assignments or exams, I may be prosecuted under the Lakehead University Student Code of Conduct – Academic Integrity, which requires students to act ethically and with integrity in academic matters and to demonstrate behaviours that support the University’s academic values.

Academic Integrity

A breach of Academic Integrity is a serious offence. The principle of Academic Integrity, particularly of doing one’s own work, documenting properly (including use of quotation marks, appropriate paraphrasing and referencing/citation), collaborating appropriately, and avoiding misrepresentation, is a core principle in university study. Students are strongly advised to familiarize themselves with the Student Code of Conduct - Academic Integrity ("[The Code](#)") - and, in particular, **sections 26 and 83 through 85**. Non-compliance with the Code will NOT be tolerated in this course and the Code will be adhered to in terms of disciplinary action. The Code provides a full description of academic offences, procedures when Academic Integrity breaches are suspected and sanctions for breaches of Academic Integrity. For more information about Student Code of Conduct, please visit:

<https://www.lakeheadu.ca/students/student-life/student-conduct>

Copyright

Students should be aware that all instructional, reference, and administrative materials prepared for this course are protected in their entirety by copyright. Students are expected to comply with this copyright by only accessing and using the course materials for personal educational use related to the course, and that the materials cannot be shared in any way, without the written authorization of the course instructor. If this copyright is infringed in anyway, students may be prosecuted under the Lakehead University Student Code of Conduct – Academic Integrity, which requires students to act ethically and with integrity in academic matters and to demonstrate behaviours that support the University’s academic values.

University Regulations

It is the responsibility of each student registered at Lakehead University to be familiar with, and comply with all the terms, requirements, regulations, policies and conditions in the Lakehead University Academic Calendar. This includes, but is not limited to, Academic

Program Requirements, Academic Schedule of Dates, University and Faculty/School Policies and Regulations and the Fees and Refund Policies and Schedules.

Here is the link to the University's 2025-2026 Academic Calendar:

<https://csdc.lakeheadu.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&loadusercredits=False/>

Support for Students

There are many resources available to support students. These include but are not limited to:

- [Health and Wellness](#)
- [Student Success Centre](#)
- [Student Accessibility Centre](#)
- [Library](#)
- [Lakehead International](#)
- [Indigenous Initiatives](#)

Lakehead University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities and/or medical conditions to ensure they have an equitable opportunity to participate in all of their academic activities. If you are a student with a disability and think you may need accommodations, you are strongly encouraged to contact Student Accessibility Services (SAS) and register as early as possible. For more information, please contact [Student Accessibility Services](#) (SC0003, 343-8047 or sas@lakeheadu.ca).

For more information about resources available for Student Supports, please visit:

Important Dates

First day of classes	September 2, 2025
Final day of classes	December 2, 2025
Final day to register	September 15, 2025
Final day to withdraw	November 7, 2025
Marks due	December 18, 2025
Study Break	October 13 – 17, 2025

Tentative Schedules and Lecture Topics

- Lecture notes will be posted on D2L in advance. They are intended as guides. The corresponding chapters in the textbook must be studied for exams.
- Lecture topics are subject to change. Schedules are approximate.

Week	Date	Lecture Topic	Textbook	Assignments Due dates	Laboratory
1	Tu/Sept 02 Th/Sept 04	1. Course Overview and Introduction (1.5)	Chapter 1.1, 1.3	Homework 1 Sat/Sept13 ungraded	No lab
2	Tu/Sept 09 Th/Sept 11	2. Protein Composition and Structure (2.5)	Chapter 2.1 – 2.7	Assignment 1 Sat/Sept20 1.8%	Lab 1. Introduction to automatic pipettors, proper pipetting technique and spectrophotometry 3.5%
3	Tu/Sept 16 Th/Sept 18	3. DNA and RNA (2)	Chapter 8.1 – 8.6	Assignment 2 Sat/Sept27 1.8%	Lab 2. Introduction to recombinant DNA methodology 4%
4	Tu/Sept 23 Th/Sept 25	4. Lipids and Biological Membranes (2)	Chapter 12.1–12.6	Assignment 3 Sat/Oct4 1.8%	Lab 3 (Part 1) Purification of chicken egg white lysozyme: Ion-exchange chromatography and lysozyme quantification 1%
5	Tu/Sept 30 Th/Oct 02	Truth & Reconciliation – No class 5. Membrane Channels and Pumps (2.0)	Chapter 13.1–13.6	Assignment 4 Sat/Oct11 1.8%	Lab 3. (Part 2) Purification of chicken egg white lysozyme: Protein content determination by the Bradford method and SDS-PAGE gel preparation 2.5%
6	Tu/Oct 07 Th/Oct 09	6. Protein Methods (1)	Chapter 4.1, 4.3	Homework 2 Sat/Oct17 ungraded	No lab
7	Oct 13 - 17	Study Break – No class			No Lab
8	Tu/Oct 21 Th/Oct 23	Review Midterm Exam (25%)			Lab 3. (Part 3) Purification of chicken egg white lysozyme: SDS-PAGE of chicken egg white and purified lysozyme 6%
9	Tu/Oct 28 Th/Oct 30	7. Carbohydrates (1) 8. Basic Concepts and Themes of Metabolism (1)	Chapter 11.1, 11.2 Chapter 15.1–15.4	Assignment 5a and 5b Sat/Nov8 1.8%	Lab 4. Comparison of carbohydrate content in beverages 4%
10	Tu/Nov 04 Th/Nov 06	9. Glycolysis (1.5) 10. Gluconeogenesis (1)	Chapter 16.1–16.3 Chapter 16.4-16/5	Assignment 6 Sat/Nov15 1.8%	Lab 5. Lipids – Biological properties of lipids and membranes 4%
11	Tu/Nov 11 Th/Nov 13	11. Citric Acid Cycle (1.5)	Chapter 17.1–17.6	Assignment 7 Sat/Nov22 1.8%	No lab
12	Tu/Nov 18 Th/Nov 20	12. Oxidative Phosphorylation (1.5) 13. Fatty Acid Metabolism (1.5)	Chapter 18.1, 18.3 – 18.6 Chapter 22.1–22.7	Assignment 8a and 8b Sat/Nov29 1.8%	No lab
13	Tu/Nov 25 Th/Nov 27	14. Pentose Phosphate Pathway (1)	Chapter 20.3, 20.4	Homework 3 Tues/Dec2 ungraded	No lab
14	Tu/Dec 02	Review			
14 -16	Dec 5 - 15	Final Exam (35%)			