Department of Chemistry
CHEM-3271/BIOL-3272-WA – Biochemistry II
Course ID: 156651/158151
2026 Winter
Course Outline

Instructor Information

Instructor:	Dr. Justin Jiang
Office Location:	CB4021
Telephone:	807-343-8010 ext. 7171
E-mail:	zjiang@lakeheadu.ca
Office Hours:	Wednesday & Thursday 2:00 – 3:00 pm; and by appointment

Lab Instructor Information

Lab Instructor:	Christina Richard
Office:	CB2028A
Phone:	807-343-8010 ext. 8765
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Course Prerequisites: Chem3251/Biol3252 or equivalent

Course Description (in Course Calendar)

Enzyme kinetics. Mechanism of enzyme reactions. Biosynthesis of terpenes and steroids. Sequence determination of DNA and RNA using electrophoretic methods. Chemical synthesis of polynucleotides. DNA replication. Protein synthesis.

Lectures

Time: Tuesday & Thursday, 11:30 – 1:00
Location: RB1045

Key Course Learning Objectives

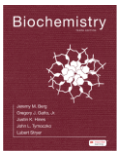
Upon successful completion of this course, the student will have reliably demonstrated the ability to:

- Understand the key concepts of enzymes including enzyme kinetics, catalytic and regulatory strategies, and enzyme inhibition.
- Identify the common cellular signaling pathways and the general strategies of signal transduction.
- Describe the key features of energy metabolism involving glycogen/glucose, proteins and amino acids, and how different metabolic pathways are interconnected and integrated.
- Identify the biochemical reasons behind a number of diseases and how certain drugs work.
- Conduct experiments according to laboratory procedures and critically analyze experimental data.
- Perform literature search on a specific bio/chemical topic and collect relevant information.
- 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/176452.
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. The textbook is available at the LU Bookstore.



- **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

I. Achieve Course Info:

- Course URL: https://achieve.macmillanlearning.com/courses/t9wzv2/mycourse
- Achieve Course ID: t9wzv2
- The course on Achieve is displayed as follows:

Course Name	Course ID	Meeting Times	Term	Institution	Term Dates	Students Enrolled	
Biochemistry II (2026W) Chem 3271/Biol 3272 Template: Stryer/Berg, Biochemistry, ...	t9wzv2	TuTh 11:30 ...	Winter 2026	Lakehead University	Start: Jan-... End: Apr-0...	0	•••

II. Ebook Access (4 year access):

- Students who purchase Achieve will have access to the eBook for the duration of their education or 4 years by following these instructions!

III. 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.

IV. Achieve Tech Support Options:

- Via Chat - available 24/7
- If you run into a technical issue, please contact customer support using the link above. If they are unable to immediately resolve your issue, you will be given a Case Number, which is required for additional troubleshooting.

Labs

This course has a laboratory component that is required for obtaining the course credit. If you are repeating this course and wish to use your previous lab mark, this may be considered. Please contact the course instructor in the first week to discuss whether you are eligible for exemption from the labs.

- **Important:** In order to receive a passing grade for this course, you are required to obtain 50% or higher grade for the lab component.
  Location: CB2050/2051
  Lab Sections: W1, Wednesday 2:30 – 5:30 PM
  W2, Monday 2:30 – 5:30 PM

Assessments

In order 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 grades are below the passing grade of 50%.

Item	Weight%
Assignments (x 8)	10
Labs	25
Midterm Exam	25
Final Exam	35
Flexible Distribution	5
Total	100

(*) The Flexible Distribution (5%) will be added to either the Midterm or Final Exam, whichever you have got a higher mark for. For example, if you have got a higher mark for the final exam, the weighting will be as follows:

Midterm Exam 25%
Final Exam 40%

Assignments

There are eight online Assignments on Achieve (Macmillan Learning), which corresponds to the end-of-chapter problems from those chapters we are discussing in the class. 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 **Tuesday, February 24, 2026**, 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 will be 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 taking lab courses offered by the chemistry department are required to complete the Department of Chemistry's online chemical safety course before beginning the lab session. It can be assessed through MyCourseLink on D2L, entitled "myChemistry". Instructions can be found under "Content > Overview". There are three components to this course:

  1) WHMIS with GHS
  2) Chemistry Department Safety Regulations
  3) Academic Integrity Matters

  You must complete the lab safety course once, which will be valid for all courses in the department for the 2025-26 academic year. Students from other faculties who have already done WHMIS training will not have to do the training twice but will be required to upload a copy of their training certificate to the departmental website. The other two chemistry department specific modules will need to be completed.

  If you did the above safety training for CHEM-3251/BIOL-3272 or other lab course in 2025 fall term, you do not need to repeat it this term. You can confirm with the lab instructor that you have all the necessary information.

  For the labs you will need a lab coat and safety glasses. I recommend buying a pair of comfortable safety glasses. The bookstore has several styles available. If you wear glasses, the safety glasses/googles need to be able to fit over your prescription and still provide protection to splashes from the front and sides. The lab coat must be full length (not M.D. or pharmacy length) and made from cotton or other non-synthetic material and have snaps for the closure. Lab coats meeting this requirement can be purchased in the bookstore. Please consult the laboratory manual for other guidelines on things such as footwear.

- 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&loaduseredits=False/

Supports 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: https://www.lakeheadu.ca/campus-life/student-supports

Important dates:

- First day of classes: January 5, 2026
- Final day of classes: April 7, 2026 (makeup for Good Friday)
- Final date to register (add): January 16, 2026
- Final date of withdraw (drop): March 6, 2026
- Winter study break: February 16 – 20, 2026
- Good Friday: April 3, 2026
- Easter Monday: April 6, 2026
- Winter exam study period: April 8 – April 9, 2026
- Final exam period: April 10 – April 19, 2026
- Exam contingency date: April 20, 2026
- Marks due: April 23, 2026

Approximate Schedules and Lecture Topics

Week	Date	Topic	Textbook	Assignment Due Date	Lab
1	Jan 4-10 (Tu/Th)	1. Review of pKa, Buffers, and Amino Acids (1)	chapter 1.3 chapter 2.2	Assignment 1 (1a &1b) Jan 24	No lab
		2. Enzyme Core Concepts and Cofactors (2)	chapter 5.0 – 5.3		
2	Jan 11 -17 (Tu/Th)		chapter 15.4	Assignment 2 Jan 31	Lab 1 (3.5%)
		3. Enzyme Kinetics (1.5)	chapter 5.4		
3	Jan 18-24 (Tu/Th)	4. Enzyme Inhibition (1.5)	chapter 5.6 chapter 12.4 chapter 32.1, 32.2		No lab
4	Jan 25-31 (Tu/Th)	5. Enzyme Catalytic Strategy (2)	chapter 6.0 – 6.4	Assignment 3 Feb 7	Lab 2 (3.5%)
5	Feb 1-7 (Tu/Th)	6. Enzyme Regulatory Strategy and Enzyme Protective Mechanisms (2)	chapter 7.0 – 7.4 chapter 18.3 chapter 20.5 chapter 27.4 chapter 32.3	Assignment 4 Feb 14	Lab 3 (6%)
6	Feb 8-14 (Tu/Th)	7a. Signal Transduction I (2) - Overview Mini Review	chapter 3.1 chapter 14.0 – 14.6		No lab
7	Feb 15-21	Study Break			No lab
8	Feb 22-28 (Tu/Th)	**Midterm Exam (Tu Feb 24)** 7a. Signal Transduction I (2) - GPCR Pathways	chapter 14.0 – 14.6	Assignment 5 Mar 07	No lab
9	Mar 1-7 (Tu/Th)	7b. Signal Transduction II (2) - TKR Pathways - Innate Immune Defense	chapter 14.0 – 14.6		Lab 4 (3.5%)
10	Mar 8-14 (Tu/Th)	8. Glycogen Metabolism (2)	chapter 21.0 – 21.5	Assignment 6 Mar21	Lab 5 (4%)
11	Mar 15-21 (Tu/Th)	9. Protein Turnover and Amino Acid Catabolism (2)	chapter 23.0 – 23.6	Assignment 7 Mar 28	No lab
12	Mar 22-28 (Tu/Th)	10. Integration of Energy Metabolism (2)	chapter 24.0 – 24.6	Assignment 8 Apr 04	No lab
13	Mar 29-Apr 4 (Tu/Th)	11. Biosynthesis of Amino Acids (1.5) Mini Review	chapter 25.0 – 25.4	Assignment 9 ungraded	Lab 6 (4.5%)
14	Apr 5-7 (Tu)	Makeup for Good Friday No class			
14	Apr 8-9	Study Period			
14-16	Apr 10-20	Final Exam			

- 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.