Department of Chemistry
Biochemistry II
Chem3271/Biol3272
2022 Winter
Course Outline

Instructor Information

Instructor:	Dr. Justin Jiang
Office Location:	CB4021
Telephone:	766-7171
E-mail:	zjiang@lakeheadu.ca
Office Hours:	Tuesday & Thursday 4:00 – 5:00 pm; or by appointment

Lab Instructor Information

Lab Instructor:	Christina Richard
Office:	CB2028A
Phone:	807-343-8765
Email:	crichar3@lakeheadu.ca

Course Prerequisites: Chem3251/Biol3271 or equivalent

Course Location and Times

Class Location:	BB2006 and/or Zoom
Class Times:	Monday & Wednesday 1:00 – 2:30 pm
Zoom Link:	https://lakeheadu.zoom.us/j/97298180155

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.

Labs
This course has a laboratory component and is required for getting 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 within the first two weeks of the course.

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 key steps involved in the development of a drug.
- 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

- Course Website:
  myCourseLink on D2L: https://mycourselink.lakeheadu.ca/d2l/home/86733
  Lecture notes, Lab Manual, and other course materials will be uploaded on D2L.
- Textbook:
  Biochemistry, 9th edition by Berg/Stryer/Tymoczko/Gatto, W.H. Freeman and Company, New York, 2019. ISBN-10: 1-319-03681-3; ISBN-13: 978-1-319-03681-2. Both digital and hard copies of the textbook are available at the Bookstore.

Mark Distribution and Due Dates

Item	Due Date	Weight%
Quizzes (10 x 1.5%)	Weekly, Fri. 8 pm to Sun. 8 pm	15
Midterm exam	Wednesday, Feb. 16, 2022	25
Labs	Lab 1 report (3.5%): Jan. 31 or Feb. 03 Lab 2 report (3.5%): Feb. 10 or Feb. 10 Lab 3 report (6.0%): Feb. 28 or Mar. 03 Lab 4 report (3.5%): Mar. 07 or Mar. 10 Lab 5 report (4.0%): Mar. 21 or Mar. 24 Lab 6 report (4.5%): Apr. 04	25
Final Exam	TBD	35
Total		100

Important:

In order to receive a passing grade for this course, you must obtain a minimum of 50% marks from the lab component of this course. You would not be eligible for the Special Exam if you have not passed the lab component of the course.

Due Dates:

- Grading activities carry due dates which are posted on the Course Outline/Lab Manual and/or on D2L. 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.

Assignments/Quizzes

There are 10 short quizzes scheduled on D2L as a mean to assist you in learning the course materials. The quiz is open at 8 pm on each Friday and closed at 8 pm on Sunday. You have 30 min to complete each quiz. For students registered with Student Accessibility Services (SAS), the time allowed to complete the quiz will be adjusted accordingly.

Late Assignments/Quizzes/Lab Reports

- Late assignments/quizzes will automatically receive a zero (0) mark.
- Late lab reports will receive a penalty of mark deduction. Please refer to the Lab Manual for more information.

Exams

- There is one scheduled midterm exam 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 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. The deadline for completion of all three modules is January 31, 2022 (Monday lab section) or February 03, 2022 (Thursday lab section).

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 2021-2022 Academic Calendar:
http://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

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	Lec	Date	Topic	Textbook	Lab
1 Quiz 1	1	Jan 10/M	Review pKa, Buffer and Amino Acids	chapter 1.3 chapter 2.1, 2.2	No lab
	2	Jan 12/W	Enzymes: Basic Concepts	chapter 8.0 – 8.3	
2 Quiz 2	3	Jan 17/M	Enzyme Kinetics	chapter 8.4	No lab
	4	Jan 19/W Jan 21/F: final date to register	Enzyme Inhibition I	chapter 8.5	
3 Quiz 3	5	Jan 24/M	Enzyme Cofactors	Ch 8.1; Ch 15.4; Ch 18.3	Lab 1: Buffers, buffering capacity and the Henderson-Hasselbalch equation (3.5%)
	6	Jan 26/W	Enzyme Catalytic Strategy	chapter 9.0 – 9.2	
4 Quiz 4	7	Jan 31/M	Enzyme Regulatory Strategy	chapter 10.1 – 10.4	Lab 2: Vitamin C content in fruit juices (3.5%)
	8	Feb 02/W	Enzyme Inhibition II	Ch 8.5, Ch28.2	
5 Quiz 5	9	Feb 07/M	Enzymatic Protective Mechanisms	Ch 18.3 Ch 20.5; Ch 24.4 Ch 26.4	Lab 3: Michaelis-Menten kinetics of mushroom tyrosinase (6%)
	10	Feb 09/W	Protein–Ligand Binding		
6	11	Feb 14/M	Mini Review		No Lab
	12	**Feb 16/W**	**Midterm Exam** (25%)		
7		**Feb 21 - 25**	**Study Break**		No Lab
8 Quiz 6	13	Feb 28/M	Signal Transduction 1: Overview	chapter 14.0 – 14.5	Lab 4: Inhibition studies of mushroom tyrosinase (3.5%)
	14	Mar 02/W	Signal Transduction 2: G-protein-associated Pathways	chapter 14.0 – 14.5	
9 Quiz 7	15	Mar 07/M	Signal Transduction 3: Receptor Tyrosine Kinase Pathways	chapter 14.0 – 14.5	No Lab
	16	Mar 09/W Mar 11/F: final date to withdraw	Innate Immune Defense		
10 Quiz 8	17	Mar 14/M	Glycogen Metabolism 1	chapter 21.1 – 21.5	Lab 5: Protein/ligand interactions: A competitive protein-binding experiment (4%)
	18	Mar 16/W	Glycogen Metabolism 2	chapter 21.1 – 21.5	
11 Quiz 9	19	Mar 21/M	Protein Turnover & Amino Acid Degradation 1	chapter 23.0 – 23.6	No Lab
	20	Mar 23/W	Amino Acid Degradation 2	chapter 23.4 – 23.6	
12 Quiz 10	21	Mar 28/M	Biosynthesis of Amino Acids	chapter 24.0 – 24.3	No Lab
	22	Mar 30/W	Integration of Metabolism & Ketone bodies	chapter 27	
13	23	Apr 04/M	Drug Discovery and Development	chapter 28	Lab 6: Computer-based investigation of the Biochemistry of Diseases (4.5%)
	24	Apr 06/W	Review		
14-15		Apr 11-24	**Final Exam** (35%)		