



Biochemistry 2280A Biochemistry and Molecular Biology

Course outline for Fall 2023



Western University is committed to a **thriving campus**; therefore, your health and wellness matter to us! The following link provides information about the resources available on and off campus to support students: <u>https://www.uwo.ca/health/</u> Your course coordinator can also **quide you** to resources and/or services should you need them.

The Department of Biochemistry recognizes diversity of identity and experience as a source of strength that promotes excellence, innovation, flexibility and adaptability in our discipline. We embrace, nurture, value and celebrate this diversity.

1. Technical Requirements:



Stable internet connection



Laptop or computer

2. Instructor and Contact Information

Instructors	Topics	Office Hours**	Office Hour Dates
<u>Dr. James Choy</u> (he/him)	1-5	Thu 3:00 – 5:00 pm Zoom or MSB 302	Sep 14 – Oct 26
Dr. Derek McLachlin* (he/him)	6-16	Tue 2:30 – 4:30 pm Zoom or MSB 349	Oct 3 to final exam
Dr. Ilka Heinemann (she/her)	17-23	Fri 12:30 – 2:00 pm Zoom or MSB 358	Nov 17 to final exam

* course coordinator

** See the Zoom tool on the OWL site for links. Zoom sessions will be opened only upon email request.

Rather than email instructors directly about course content, students are encouraged to post questions to the Forums tool on the OWL site (see Section 8). In addition, students may email Rasangi Tennakoon (she/her, a graduate teaching assistant, <u>rtennako@uwo.ca</u>) for individual appointments.

Ms. Neiven Timothaws (she/her) handles course administration, and should be contacted about makeup tests. Email: <u>Neiven.timothaws@schulich.uwo.ca</u> Phone: 519-661-2111 ext. 86850

Office: MSB 342

Phone: 519-661-2111 ext. 86850 Hours: Mon-Fri 9:00 am – 4:00 pm

3. Course Delivery and Design

Biochemistry is the study of the molecules of life and centers on four key groups of biomolecules: proteins, lipids, carbohydrates and nucleic acids. Students will learn about the structure and function of these key biomolecules, the mechanics by which the cellular machinery is supplied with energy, and how the genetic material is converted to functional information. Students will also learn the techniques

of recombinant DNA technology and bioinformatics that have profoundly changed how we study and use cell functions.

Prerequisites: One of Bio 1001A or 1201A; one of Bio 1002B or 1202B; Chem 1301A/B; AND Chem 1302A/B. Integrated Science 1001X can be used in place of Bio 1002B and Chem 1302A/B.

Delivery Mode: In-person

Timetabled Sessions

Lecture Section	Days	Time	Location
001	Mon Wed Fri		
002	Mon Wed		
002	Thu		

All course material will be posted to OWL: <u>http://owl.uwo.ca</u>. Any changes will be indicated on the OWL site and discussed with the class. We expect to record and post audio for all lecture sessions.

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

<u>Google Chrome</u> or <u>Mozilla Firefox</u> are the preferred browsers to optimally use OWL; update your browsers frequently. Students interested in evaluating their internet speed, please click <u>here.</u>

4. Learning Outcomes

Upon successful completion of this course, students will be able to:

- 1. Demonstrate basic knowledge about the structure, roles, and functions of the different classes of biomolecules.
- 2. Provide examples where defects in biochemical processes result in disease, and predict potential outcomes of biochemical defects.
- 3. Describe the central pathways that provide living organisms with energy, and the regulation of these pathways.
- 4. Detail information flow in living systems and mechanisms that regulate the expression of genetic material.
- 5. Formulate an approach to clone and express a gene of interest in bacteria.
- 6. Obtain and interpret scientific information from literature, databases and oral presentations.
- 7. Explain scientific concepts in a way that can be understood by a general audience.

5. Course Content and Schedule

Dates	Topics	Instructor
Sep 7-27	1. Fundamental concepts of biochemistry	Choy
	Amino acids and ionization*	
	Protein structure and analysis	
	4. Protein function	
	5. Enzyme catalysis	
Sep 28-29	No class – National Day for Truth and Reconciliation	
	Lipids and biological membranes*	McLachlin
	Carbohydrate structure*	
$Oct 2_27$	Fundamental concepts in metabolism*	
(no class Oct 9 -	9. Carbohydrate metabolism	
(no class out 5 Thanksgiving)	10. Citric acid cycle*	
Thanksylving)	11. Oxidative phosphorylation	
	12. Lipid metabolism	
	13. Summary of energy metabolism*	
Oct 28, 2-5 pm	Midterm test, Topics 1-13, rooms will be posted to OWL	
	14. Nucleic acid structure*	McLachlin
Nov 6-13	15. DNA replication	
	16. DNA repair	
	17. Molecular basis of cancer	Heinemann
	18. Bacterial transcription	
Nov 15-Dec 8	19. Eukaryotic transcription	
	20. RNA processing	
	21. Translation	
	22. Recombinant DNA technology	
	23. Sequencing genomes	
	Final exam, Topics 14-23, date and rooms will assigned by	
Dec exam period	Registrar's Office. DO NOT book travel plans until after the	
	date of the final exam is set.	

Schedule is subject to change. Lectures are in NCB 101. Students must attend their assigned section.

* Short videos will be assigned for students to watch before these topics begin.

6. Evaluation

Your grade in this course will be the highest of the grades calculated according to the 8 weighting schemes in the table below (all numbers are percent of your overall grade).

Assessment	1	2	3	4	5	6	7	8
Background quiz	2	2	0	0	2	2	0	0
Best 4 of 6 quizzes	12	12	12	12	0	0	0	0
Infographic assignment	15	15	15	15	15	15	15	15
Scientist Spotlight reflections	5	5	5	5	5	5	5	5
Midterm test (Topics 1-13)	30	36	31	37	36	42	37	43
Final exam (Topics 14-23)	36	30	37	31	42	36	43	37

Due dates for each assessment are as follows. Note that the infographic and Scientist Spotlight assignments have multiple components, each with its own due date.

Assessment	Default Value (%)	Due Date*
Background quiz	2	Fri Sep 15
Quiz 1 (Topics 1-4)	3†	Wed Sep 27
Quiz 2 (Topics 5-7)	3†	Wed Oct 11
Quiz 3 (Topics 8-11)	3†	Wed Oct 25
Quiz 4 (Topics 14-16)	3†	Fri Nov 17
Quiz 5 (Topics 17-19)	3†	Mon Nov 27
Quiz 6 (Topics 20-21)	3†	Wed Dec 6
Infographic assignment		
Team Assignment Survey	0.5	Fri Sep 15
First Submission	3	Mon Oct 16
Evaluation of Peer Submissions	1.5	Wed Oct 25
Final Submission	9	Wed Nov 8
Peer Teamwork Assessment	1	Fri Nov 10
Scientist Spotlights		
Initial reflection	0.5	Fri Sep 22**
Spotlight reflection – scientist #1	1	Fri Oct 6
Spotlight reflection – scientist #2	1	Fri Oct 20
Spotlight reflection – scientist #3	1	Fri Nov 24
Spotlight reflection – scientist #4	1	Fri Dec 8
Final reflection	0.5	Fri Dec 8
Midterm test (Topics 1-13)	30	Sat Oct 28
Final exam (Topics 14-23)	36	TBD

* All submissions are due at 11:55 pm on the date specified.

** September 22 is the recommended due date. The actual due date is December 8, but you will not be able to access information for the spotlights until you have submitted the initial reflection.

[†] The best 4 of the 6 quiz marks will be counted toward your final grade; the lowest two quiz marks will be dropped.

Any grade appeals on quizzes, assignments, or the midterm must be received within 3 weeks of the grade being posted. For team assignments, a student might not receive the same grade as their group members if it is determined that the distribution of work was not equal.

Background Quiz – The background quiz consists of questions designed to refresh your memory about key concepts relevant to Biochemistry that should have been covered in first-year Biology and Chemistry. The quiz will be available on OWL before the first day of classes, and is due Friday September 15 at 11:55 pm. You can repeat the quiz as many times as you like before the deadline; only your best score will be counted.

Quizzes 1-6 – These quizzes will consist of 10 multiple-choice questions, and are intended to encourage students to keep up with the material throughout the term. The quizzes will be administered through the OWL Tests & Quizzes tool. The quizzes will be available 72 hours before they are due, and are due by 11:55 pm on the date specified. Once started, students will have 25 minutes to do each quiz. The quizzes are linear, meaning that after you have answered a question, you will not be able to return to it. Practice questions will be available for each topic. Only your 4 best quizzes will be counted; your lowest two quiz marks will be dropped.

Infographic Assignment – Collaboration is a necessary skill when working in science. Each student will be assigned to a team of up to 4, with teams communicated via the PostEm tool on OWL on Monday, September 18. Students may not choose their teammates. Each team will prepare an infographic on a biochemistry-related topic. Detailed instructions, including marking rubrics and details of peer assessment, are provided in a separate document. Students are responsible for ensuring that the correct file version is uploaded, and may not receive extra time for incorrect submissions including corrupt files. Text of infographics will be submitted to Turnitin (see statement below).

Scientist Spotlights – To encourage students to reflect on the types of people who do science, you will write 6 short reflections: an initial reflection, 4 reflections based on information provided about individual scientists you select from a list of options, and a final reflection. Detailed instructions are provided in a separate document. Reflections are due throughout the term; you will not have access to the information about scientists until you submit the initial reflection. Reflections will be submitted to Turnitin (see statement below).

Test and exam – The 3-hour midterm test will cover Topics 1-13 and will be held Saturday, October 28 starting at 2:00 pm. The 3-hour final exam will cover Topics 14-23 and will be scheduled by the Registrar's Office. Students should not make travel commitments before verifying when the final examination will be held through the Registrar's Student Centre interface.

Room assignments for the midterm test and final exam will be posted on the OWL course site. All students are responsible for determining where they are to write each examination and to appear at the designated room on time.

Students must provide their own pencils and erasers (pens are not allowed) for the examinations and they **MUST bring their Student ID card**. Electronic devices, including (but not limited to) calculators, cell phones, mp3 players, and "smart" watches are NOT allowed in the exam rooms.

Biochemistry 2280A exams include multiple choice questions completed on bubble sheets. This course uses software that will detect unusual coincidences in answer patterns that may indicate cheating. Students should note that discrepancies between answers circled on their exam and those recorded on their bubble sheets will not be adjusted.

Late or missed evaluations

Quizzes – Late submissions of the Background Quiz or any of Quizzes 1 to 6 will be accepted up to 48 hours after the deadline. Quizzes may not be submitted more than 48 hours after the deadline, and there will be no makeup quizzes. Note that your lowest two quiz marks will be dropped, and the alternate weighting schemes allow students to achieve a high mark in the course even if none of the quizzes are completed.

Infographic assignment and Scientist Spotlights – We will accept any component of these assignments, except for the Team Assignment Survey, up to 48 hours past the deadline. Submissions will not be accepted more than 48 hours past the deadline. If some members of a team are ill, then other members should complete the infographic assignment without them.

Because of the work needed to assign teams and our desire to post teams on Monday, September 18, late submission of the Team Assignment Survey will not be accepted.

Midterm test and final exam – Students who miss the midterm and who meet the criteria for academic consideration set by their Dean's office will be able to write a make-up test on **Thursday**, **November 9 at 7:00 pm**. Please submit documentation to your Dean's office and contact Ms. Timothaws for details.

If you miss both the scheduled midterm and the make-up test you will be required to write a comprehensive final examination (Topics 1-23) worth the total value of both the midterm and final exams. You must obtain permission for this special exam from the office of your Dean and contact Ms. Timothaws at least 3 weeks before the date of the final exam.

If you miss the final exam, please contact your faculty's Academic Counselling Office as soon as you are able to do so. They will assess your eligibility to write the Special Exam (the name given by the university to a makeup final exam).

You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (see http://www.registrar.uwo.ca/examinations/exam_schedule.html).

Click <u>here</u> for a detailed and comprehensive set of policies and regulations concerning examinations and grading. The table below outlines the University-wide grade descriptors.

A+	90-100	One could scarcely expect better from a student at this level
Α	80-89	Superior work which is clearly above average
В	70-79	Good work, meeting all requirements, and eminently satisfactory
С	60-69	Competent work, meeting requirements
D	50-59	Fair work, minimally acceptable
F	below 50	Fail

Statement about the use of artificial intelligence (AI) tools (e.g., ChatGPT)

Use of AI tools is not forbidden in this course. However, information produced by AI tools is necessarily limited by the data used to train the software. Therefore, AI tools may produce inaccurate, biased, constrained or discriminatory output. Such tools are notoriously prone to confidently making illogical or factually incorrect statements and inventing sources. Therefore, you should always fact-check AI output and carefully consider whether the output contains biases or gaps. It may be more efficient for you to simply do the work yourself from the start.

Students should document any use they make of AI software to complete assessments in this course by saving the submitted prompts and the software's responses, including dates. If you used AI during preparation of submitted work, you must include a statement describing what software was used and detailing specifically how its responses contributed to the finished product. For the infographic assignment, this statement should be included with the References.

Ultimately, students are responsible for the work they submit, including any false, biased, racist, or otherwise inappropriate content produced by Al tools.

7. Resources

Required Textbook: Essential Biochemistry, Fifth Edition by Charlotte Pratt & Kathleen Cornely, published by Wiley Inc. This book is available online through WileyPlus, or as a physical book; to purchase either, inquire at the campus bookstore. Refer to the OWL site for the suggested readings for each topic.

Course notes for each topic as well as recorded lectures and interactive online modules will be available on OWL. To access the material on OWL, you must achieve a perfect score on an OWL quiz relating to this syllabus. This quiz does not count toward your mark, and you can repeat it as many times as necessary.

8. Communication

Information and announcements related to the course will be communicated through OWL or using a student's Western University email address. Students are expected to check the OWL site regularly and their email at least every 48 hours. Please use the Forums tool on OWL for all non-personal course-related queries so that everyone can see the responses. Students' names are not visible to other students. Please keep your interactions friendly and respectful. For personal or confidential matters, students may email Ms. Timothaws or Dr. McLachlin directly. Posts to the forum or emails will receive a response within 2 business days, if not sooner.

9. Professionalism and Privacy

Course material produced by faculty is copyrighted and cannot be sold or shared (*e.g.* Must Knows Facebook group, Course Hero, Chegg, etc.). Recordings (audio or video) are not permitted without explicit permission. Permitted or posted recordings are not to be distributed.

Western students are expected to follow the <u>Student Code of Conduct</u>. Western is committed to providing a learning and working environment that is free of harassment and discrimination. All **students**, staff, and faculty have a role in this commitment and have a responsibility to ensure and promote a safe and respectful learning and working environment. Relevant policies include Western's <u>Non-Discrimination/Harassment Policy</u> (M.A.P.P. 1.35) and <u>Non-Discrimination/Harassment Policy</u> – <u>Administrative Procedures</u> (M.A.P.P. 1.35).

Any student, staff, or faculty member who experiences or witnesses' behaviour that may be harassment or discrimination **must report the behaviour** to the Western's <u>Human Rights Office</u>. Harassment and discrimination can be human rights-based, which is also known as EDI-based, (sexism, racism, transphobia, homophobia, islamophobia, xenophobia, antisemitism, and ableism) or non-human rights-based (personal harassment or workplace harassment).

10. Western Academic Policies and Statements

Absence from Course Commitments

A. Absence for medical illness:

Students must familiarize themselves with the Consideration for Illness Policy.

A student seeking academic accommodation for any **work worth less than 10%** must contact the instructor or follow the appropriate Department or course specific instructions provided on the course outline. Instructors will use good judgment and ensure fair treatment for all students when considering these requests. You are not required to disclose details about your situation to your instructor; documentation is not required in this situation, and you should not send any pictures to your instructor.

If you are unable to meet a course requirement for any **work worth 10% or greater** due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to the Academic Counseling as soon as possible and contact your instructor immediately. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed. Please note that the format of a make-up test, exam, or assignment is at the discretion of the course coordinator.

A student requiring academic accommodation due to illness should use the Student Medical Certificate when visiting an off-campus medical facility or request a Record's Release Form (located in the Dean's Office) for visits to Student Health Services. The form can be found at: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf

B. Absence for non-medical reasons:

Student absences might also be approved for non-medical reasons such as religious holidays and compassionate situations. Please review the policy on <u>Accommodation for Religious Holidays</u>. All non-medical requests must be processed by Academic Counselling. Not all absences will be approved; pay attention to the academic calendar and final exam period when booking any trips.

C. Special Examinations

A Special Examination is any examination other than the regular examination, and it may be offered only with the permission of the Dean of the Faculty in which the student is registered, in consultation with the instructor and Department Chair. Permission to write a Special Examination may be given on the basis of compassionate or medical grounds with appropriate supporting documents. To provide an opportunity for students to recover from the circumstances resulting in a Special Examination, the University has implemented Special Examinations dates. These dates as well as other important information about examinations and academic standing can be found here.

Academic Offenses

Scholastic offences are taken seriously, and students are directed <u>here</u> to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence.

Accessibility Statement

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Accessible Education (AE) at 661-2111 x 82147 for any specific question regarding an accommodation or review <u>The policy on Accommodation for Students with Disabilities</u>

Correspondence Statement

The centrally administered **e-mail account** provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner. You can read about the privacy and security of the UWO email accounts <u>here</u>.

Discovery Credit Statement

Students are permitted to designate up to 1.0 Discovery Credit course (or equivalent) for pass/fail grading that can be counted toward the overall course credits required for their degree program. The details of this policy and the deadlines can be found <u>here</u>.

Turnitin and other similarity review software

All assignments will be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. Students will be able to view their results before the final submission. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between Western University and <u>Turnitin.com</u>.

15% Rule

According to the <u>Evaluation of Academic Performance</u> policy, at least three days prior to the deadline for withdrawal from a 1000- or 2000-level course without academic penalty, students will receive assessment of work accounting for at least 15% of their final grade. Generally, students can expect some form of feedback on their performance in a course before the drop date. In rare instances, at the Dean's discretion, an exemption can be issued, which also must be noted in the course syllabus. Deans should review exemptions on a course-by-course basis each time an exempted course is offered.

11. BMSUE Academic Policies and Statements

Cell Phone and Electronic Device Policy (for in-person tests and exams)

The Schulich School of Medicine & Dentistry is committed to ensuring that testing and evaluation are undertaken fairly across all our departments and programs. For all tests and exams, it is the policy of the School that any electronic devices, i.e., cell phones, tablets, cameras, smart glasses, smart watches, or iPods are strictly prohibited. These devices MUST be left either at home or with the student's bag/jacket at the front of the room and MUST NOT be at the test/exam desk or in the individual's pocket. Any student found with one of these prohibited devices will receive a grade of zero on the test or exam. Non-programmable calculators are only allowed when indicated by the instructor. The program is not responsible for stolen/lost or broken devices.

Copyright and Audio/Video Recording Statement

Course material produced by faculty is copyrighted and to reproduce this material for any purposes other than your own educational use contravenes Canadian Copyright Laws. You must always ask permission to record another individual and you should never share or distribute recordings.

Rounding of Marks Statement

Across the Basic Medical Sciences Undergraduate Education programs, we strive to maintain high standards that reflect the effort that both students and faculty put into the teaching and learning experience during this course. All students will be treated equally and evaluated based only on their actual achievement. *Final grades* on this course, irrespective of the number of decimal places used in marking individual assignments and tests, will be calculated to one decimal place and rounded to the nearest integer, e.g., 74.45 becomes 74, and 74.50 becomes 75. Marks WILL NOT be bumped to the next grade or GPA, e.g., a 79 will NOT be bumped up to an 80, an 84 WILL NOT be bumped up to an 85, etc. The mark attained is the mark you achieved, and the mark assigned; requests for mark "bumping" will be denied.

12. Support Services

The following links provide information about support services at Western University.

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Academic Counselling (Science and Basic Medical Sciences)

Appeal Procedures

Registrarial Services

Student Development Services

Student Health Services