



UBC's Point Grey Campus is located on the unceded, traditional and ancestral territory of the x^wməθk^wəyəm (Musqueam).

This syllabus is a general representation of the course as previously offered and is subject to change.

Biology 201 – Introduction to Biochemistry

General Course Syllabus (as of November 2023)

Course Description: Biological molecules, protein structure and enzyme action, energy transfer, central metabolic pathways and their regulation. Examples drawn from plants, animals and microorganisms. (Consult the Credit Exclusion list within the Faculty of Science section of the Calendar.) Credit will be granted for only one of BIOL 201, BIOC 202, or BIOC 203.

Course Format: Lecture and Tutorial

Credits: 3 credits

Prerequisites: BIOL 200 and one of CHEM 233, CHEM 260. (; or BIOL 200 and a corequisite of CHEM 213; or a corequisite of either CHEM 313 or CHEM 330.)

Course Learning Goals:

- Demonstrate understanding of the chemistry underlying the following biological processes:
 - pH-dependent behavior of biomolecules and their functional relevance under biological conditions
 - Protein folding, function and kinetics
 - Energy Transformation
 - Metabolism
- Demonstrate understanding of protein structure and its importance in protein function.
- Describe and interpret experimental data based on conceptual knowledge of chemistry and biology.
- Solve problems related to biochemistry by Integrating and applying knowledge of Chemistry and Biology.
- Articulate the interdisciplinary nature of biochemistry within the context of the 'bigger picture' of everyday life.

Course Materials:

Course Website: BIOL201 will be administered through Canvas - access to the website (see: <https://lthub.ubc.ca/guides/canvas-student-guide/>) requires UBC CWL and password.

Textbook: An access code to the digital platform ("**Achieve**" website) is EXPECTED for this course – it provides e-textbook access to Nelson DL & Cox. *Lehninger, Principles of Biochemistry*, 8th Edition. WH Freeman & Company, New York.

"Achieve" is the online companion to the textbook, where the weekly **pre-reading quizzes** will be administered. In addition to the e-text, "Achieve" houses the weekly targeted reading guides, videos and other supplemental materials, which will be assigned periodically.

Problem Sets: for topics associated with each unit of the course will be posted on Canvas at the start of each Unit.

- The Problem Sets have been explicitly designed to expose students to various types of problem-solving, and similar to those on the exams. Exams-I and Exam-II will each contain a combination of questions, including short answers, problem solving with calculations, data analysis, T/F, fill-in the blanks, and the occasional multiple-choice question.
 - Use of the Learning Objectives provided for each topic is highly recommended to guide and help focus your studying.
 - Working through the Problem Sets is the **BEST** way to learn application of concepts and prepare for the exams.

BREAKDOWN OF COURSE UNITS AND PROBLEM SETS

Week	Unit	Problem Set
1-2	Unit 1: Aqueous Ionization Tendencies	PS#1
2-4	Unit 2: Proteins 2A: Aspects of globular protein structure 2B: Protein Folding & Common Experimental Tools	PS#2 PS#3
5-6	Unit 3: Enzymes 3A: Mechanism of Enzyme Catalysis	PS#4
	Exam I	
7	3B: Enzyme Kinetics & Inhibition	PS#5
8	Unit 4: Energy Transfer 4A: The basics + ATP usage in biosynthesis	PS#6
9	4B: Mechanisms of ATP synthesis	PS#7
10-12	Unit 5: Metabolism 5A: Universal Catabolic Pathways 5B: Plant-Specific (Anabolic) Pathways	PS#8 PS#9
	Exam II	

Course Evaluation:

Assessment breakdown (students must achieve 50% = 42 /84 on EXAM-I AND EXAM-II to pass the course):		
Exam-I*	34%	(2 h)
Exam-II (Final)*	50%	(2.5 h)
*Both Exam I and Exam-II must be completed to complete the course.		
Pre-Reading Quizzes (10 x 0.5%)	5%	Weekly quizzes on Achieve, based on Targeted Reading Guides; best 10 of 11 (or 12) quizzes will be counted
Scheduled Tutorials (4 x 1%)	4%	Four Scheduled Tutorials during the term – two before Exam-I and two after Exam-I. See Tutorial Schedule for details.
Homework on Canvas	7%	- Similar to PS questions (Best 7 counted) - Other activities & homework assigned from class

INFORMATION REGARDING EXAM-I AND EXAM-II

- **In order to pass the course, a passing grade** on the aggregate scores of Exam-I and Exam-II **is required**. The exams (I and II) are worth 84 marks collectively, so a score of 42/84 (50%) or higher is required. For aggregate scores less than 50% on the Exams, scores from the remaining 16% (from Pre-Reading Quizzes, Scheduled Tutorials and Canvas Homework completion) will be added to the final grade up to a maximum of 45%.
- **Exam-I:** held on the Thursday before the start of the Reading Week Break in February.
 - If you have course conflicts at the time of Exam-I, please let us know as soon as possible.
 - If your absence was unanticipated (e.g. unexpected illness), you must notify your instructor with a completed self-declaration form for academic concession within 24 hours of the exam (the form can be found at: <https://biologyprogram.sites.olt.ubc.ca/files/2022/09/Academic-Concession-Form-2022W.pdf>)
- **Exam-II:** held during the final exam period in April. If you miss exam-II, you must apply for deferred status through the Dean's Office of your Faculty. Deferred BIOL 201 exams are scheduled by enrollment services in late July/early August.
- Exams-I and Exam-II test **different content**.
 - Exam-I will cover materials from Units 1, 2 and 3A (i.e. Problem sets 1 – 4)
 - Exam-II will cover materials from Units 3B, 4 and 5 (i.e. Problem sets 5 – 9).
 - This means: Exam-I and Exam-II are both treated as final exams for the covered topics.
- Exam-II is NOT cumulative, and it will be designed to test course units past exam-I. However, in the case where a student is unable to write Exam-I for a valid reason, they will write a Cumulative Exam during the Final Exam period, covering all course unit topics.
- Since both exams are treated as final exams, they will **NOT** be returned to students.

Course Format & Learning Activities:

- This course consists of five units, each covering a broad topic area of biochemistry.
- Each week, students are expected to complete a **pre-reading quiz** (on Achieve), attend and participate in class, work on problem sets, and complete homework problems assigned.
- The tutorials and weekly office hours (offered by Instructors and Peer Tutors), and Piazza discussion board in BIOL 201 are designed to support learning in the course.
- **Weekly tutorials** - there are two different types of the weekly tutorials:
 1. **SCHEDULED TUTORIALS:** FOUR scheduled tutorials offered during different weeks of the term. **For these scheduled tutorials, students are expected to attend the tutorial section that they are registered in.**
 2. **DROP-IN TUTORIALS:** During the rest of the term (when no Scheduled Tutorials are in session), students may drop-in to get help from TAs within the drop-in times. TA assignments to specific drop-in Tutorial sections will be posted on Canvas.
- **Piazza**, the online discussion board: In this course, we strongly encourage student engagement on Piazza – this is the platform to collaborate, discuss, etc. as you work through problems in the problem sets. Your peers are your most valuable resource for learning, and teaching each other is the best way to learn.
- **CLICKER CLOUD - the classroom response system:** This will be used in almost every lecture, as an interactive tool, to gauge your level of knowledge based on prior learning, comprehension of reading assignments, and to gauge conceptual understanding after most in-class activities.

Academic Integrity Policies:

Academic Integrity: Academic integrity is important to us, and we know it is to most students. Academic integrity means being an honest, diligent, and responsible scholar – yes, as a student you are a member of this university's scholarly community. Being a scholar in this course, among other things includes, completing assignments independently or acknowledging collaboration when appropriate, and taking exams without cheating. Collaboration through group work is an effective way to learn. We will clearly indicate when you should collaborate, for example during in-class group work and on some online homework assignments.

Any instance of cheating or taking credit for someone else's work, whether intentionally or unintentionally, can and often will result in a grade of zero for the assignment, and these cases will be reported to the Head of the Department and Associate Dean Academic of the Faculty of Science.

Course Schedule:

Week	Topics	Lecture Topics	Tutorial Week
1	Unit 1 - Aqueous Ionization Phenomena	L1: Intro. to BIOL201; Aqueous Ionization – Part 1: Predominant Species (PS), and Average Molecules (AM)	Drop-in Tutorials: work on PS1 PS#1 released
		L2: Aqueous Ionization – Part 2: PS, AM, and Isoelectric Point (pI)	
		L3: Aqueous Ionization – Part 3: PS, AM, pI	
2	Unit 2A – Globular Protein Structure	L4: 2A Globular Proteins - part1	Sched. Tutorial 1 (Jan. 16 to 19) Column Chromatography PS#2 released - Unit 2A
3		L5: 2A Globular Proteins - Part2	Sched. Tutorial 2 (Jan. 23 to 26) Gel Electrophoresis PS#3 released - Unit 2B
4	Unit 2B – Protein Folding	L6: 2B Protein Folding - Part 1	PS#4 released - Unit 3A Drop-in Tutorials: work on PS4
5	Unit 3A – Enzyme Catalysis	L7: 2B Protein Folding - Part2	
		L8: 3A Enzyme Catalysis - Part 1	
6	Exam – I	L9: 3A Enzyme Catalysis - part2 L10: 3A Enzyme Catalysis – part3 L11: 3B Enzyme kinetics	Drop-in Tutorials – PS1, PS2, PS3, PS4
Covers materials in Units 1-3A, PS 1-4			
Midterm Break – No classes			
7	Unit 3B – Enzyme Kinetics	L12: 3B Enzyme Inhibition	PS#5 released - Unit 3B Sched. Tutorial 3 (Feb 27 to March 2) Enzyme Kinetics – I
		L13: 4A Energy Transfer - Part1 (Equilibria and Steady State)	
8	Unit 4A – Energy Transfer I: Role of ATP in biosynthesis	L14: 4A Energy Transfer – Part2 (Coupled Reactions); High Energy Intermediates	PS#6 released - Unit 4A Sched. Tutorial 4 (March 6 to 9) Enzyme Kinetics – II
		L15: 4A High Energy Intermediates ctd. + 4B Mechanisms of ATP Synthesis Intro	
9	Unit 4B – Energy Transfer II: Mechanisms of ATP Synthesis	L16: 4B Oxidative phosphorylation (Oxphos) + Tools to study Oxphos	PS#7 released - Unit 4B Drop-in Tutorials: work on PS7
		L17: 4B Tools to study Oxphos ctd. + 5A Metabolism I - part1– Central Pathways Intro.	
10	Unit 5A – Metabolism: Universal Pathways	L18: 5A Metabolism I – Introduction Glycolysis – Glyco-1 to Glyco-5	PS#8 released - Unit 5A Drop-in Tutorials: work on PS7, PS8
11		L19: 5A Metabolism I– Glyco-6 to Glyco-10; anaerobic fermentation + start Aerobic Catabolism	
12		L20: 5A Metabolism I – Complete Anaerobic catabolism; PDH Reaction.	
	Unit 5B - Plant-spec. Metabolism: Photosynthesis	L21: 5A Metabolism I – TCA – part 1	
12	Unit 5B – Plant-spec. Metabolism: Secondary metabolites	L22: TCA – part 2 and wrap up	Drop-in Tutorials: work on PS7, PS8 PS#9 released - Unit 5B
		L23: 5B Metabolism II Plant-specific –part 1 Photophosphorylation and Calvin Cycle	
13		L24: 5B Metabolism II Plant-specific –part 2 Plant secondary metabolites	Drop-in Tutorials: work on PS7, PS8, PS#9
		Review	
Exam II during the FINAL EXAM period (April) Covers materials in Units 3B-5B; PS 5-9			

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University Policies:

UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence.

UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom.

UBC provides appropriate accommodation for students with disabilities and for religious, spiritual and cultural observances.

UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions.

Details of how to access support are available on [the UBC Senate website](#).