

Biochemistry 2050 4.0
Introductory Biochemistry
Winter 2023
Department of Chemistry, York University

- Course Director:** Philip Johnson
CB414
pjohnson@yorku.ca
- Classes:** Monday 11:30-12:50 LSB103
Wednesday 11:30-12:50 LSB103
- Office Hours:** Monday and Wednesday 2:00 – 3:00 pm, CB414
- Prerequisite or corequisite:** SC/CHEM 2021 3.00 or SC/CHEM 2020 6.0
- Course Description:** An introduction to biochemistry primarily for chemistry students. Course material includes cellular functions, biomolecules and metabolism.
- This course focuses on delivering the basic knowledge of Biochemistry. Specific emphasis is placed on properties of biomolecules such as water, amino acids, carbohydrates, lipids and nucleic acids. In addition, biomolecular structure, enzyme kinetics, and metabolism will be covered in lectures. During lab sessions, biochemistry lab techniques and experiments will be covered including polyacrylamide gel electrophoresis, preparation of buffers, purifications of enzymes using affinity chromatography, protein quantification, and measurements of enzyme activity.
- Text:** *Biochemistry, The Molecular Basis of Life*. McKee & McKee, Oxford University Press, 7th edition. (Recommended)
- Website:** An eClass site is set up for this course and the course notes and other useful information will be posted there.

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|------------------------|------------|-----|-------------------|
| Marking scheme: | Exam 1 | 30% | Wednesday March 1 |
| | Final Exam | 50% | |
| | Laboratory | 20% | |

(To pass the course you must pass both the lecture and laboratory parts of the course)

Laboratories: There are 8 three-hour lab sessions at variable times during the week, depending on lab group. Labs start the week of January 23.

Grading: The grading scheme for the course conforms to the 9-point grading system used in undergraduate programs at York (e.g. A+=9, A=8, B+=7, B=6, C+=5, C=4, D+=3, D=2, E=1, F=0). A letter grade for the course will be assigned based on the final percentage grade (A+=90-100, A=80-89, B+=75-79, B=70-74, C+=65-69, C=60-64, D+=55-59, D=50-54, E=40-49, F=0-39).

Academic Honesty: York students are required to maintain high standards of academic integrity and are subject to the Senate Policy on Academic Honesty.

<https://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/>

Students should also review materials on the Academic Integrity website.

<http://www.yorku.ca/academicintegrity/students/index.htm>

Access/Disability:

Students with disabilities, including physical, medical, systemic, learning and psychiatric disabilities may need accommodation in exam requirements. Students are encouraged to notify the course director and to seek advice from the Counseling and Development Centre. Failure to notify the course director of your needs in a timely manner may jeopardize the opportunity to arrange for academic accommodation.

While all individuals are expected to satisfy the requirements of their program of study and to aspire to achieve excellence, the university recognizes that persons with disabilities may require reasonable accommodation to enable them to perform at their best. The university encourages students with disabilities to register with Student Accessibility Services to discuss their accommodation needs as early as possible in the term to establish the recommended academic accommodations that will be communicated to Course Directors through their Letter of Accommodation (LOA). **Please let me know as early as possible in the term if you anticipate requiring academic accommodation so that we can discuss how to consider your accommodation needs within the context of this course.** Sufficient notice is needed so that reasonable steps for accommodation can be discussed. Accommodations for tests/exams normally require three (3) weeks (21 days) before the scheduled test/exam to arrange.

- Notes:**
- (1) **email policy.** All emails must include the name of the sender. Emails should be sent from your yorku email address and should include "Chem 2050" in the subject line. Messages from accounts like fuzzy_bunny@hotmail.com or similar may not receive a reply, probably because the email will be sent to my spam folder.
 - (2) You must notify me by email within 5 days if you miss an exam. No justification/medical note is currently necessary, just an email acknowledging you missed the exam.
 - (3) There will be **no make-up for missed exams.** For each missed exam (with appropriate documentation) the value of the exam will be added to the remaining exam and final exam (for a missed midterm exam 1) or to the final exam (for a missed midterm exam 2).
 - (4) **Re-grade policy:** If, after graded exams are returned, there is a question concerning the grading of the exam, the entire exam should be returned. The *entire* exam may be re-graded. All requests for re-grading must be made in writing and must be submitted to Dr. Johnson no later than the end of lecture 1 week after the exam is returned to the class. The request should identify the question of concern and briefly explain the scientific reason why your answer merits further consideration.

Course Outline:

- A. Introduction, cells, tissues, organs, organelles and their roles.
- B. Macromolecules, their roles and their building blocks: amino acids and proteins, nucleotides and nucleic acids, lipids, sugars and polysaccharides.
- C. Enzymes and their properties: structures and active site, introductory enzyme kinetics, coenzymes and cofactors.
- D. Metabolism: glycolysis, tricarboxylic acid cycle, electron transport and respiration, photosynthesis, fatty acid metabolism (time permitting).

Learning Objectives:

- To understand chemical properties of water, amino acids, carbohydrates, lipids and nucleotides.
- To fortify the concepts of electronegative force, hydrogen bonding, hydrophobic and hydrophilic properties of biomolecules.
- To distinguish between strong and weak acids, and review the concepts of pH and pK_a .
- Learn the importance and characteristics of buffers.
- To distinguish and recognize the four different levels of protein structure.

- To understand the relationship between amino acids sequences, protein structure, and protein function.
- To learn how enzyme activity can be altered when there are changes in an environment (such as change in pH, temperature, salt concentration, presence of detergents).
- To recognize how biomolecules can be used to transfer energy in cells.
- To learn about glycolysis and citric acid cycle.
- To learn about lipid metabolism and amino acid metabolism
- **Learn to enjoy and be excited about biochemistry**

Version 1, January, 2023