Chemistry 4493

CHEMISTRY OF BIOLOGICAL MACROMOLECULES

Course Information – January 2025

Instructor: [redacted] (subject line must contain "4493" and originate from an @uwo.ca account)

Teaching Assistant: [redacted]

Lectures: [redacted]
Start: January 6, 2025; End: April 4, 2025.
Exam period: April 7 – 28, 2025.

Office hours: By appointment (administrative matters)

Course web site: https://westernu.brightspace.com/

Prerequisites: Chemistry 2283G or Chemistry 2223B

Description: A survey of the chemistry of carbohydrates, nucleosides and amino acids particularly in the context of the laboratory synthesis oligosaccharides, polynucleotides and oligopeptides.

Course Topics:

1) Introduction: course overview; biological macromolecules and their constituents
2) Protecting group chemistry, polymer-supported chemistries, and automation in synthesis
3) Amino acids to oligopeptides: structure, properties and selected reactions of amino acids; selected historical and modern chemical synthesis of oligopeptides; synthetic peptides and peptidomimetics
4) Carbohydrates: structures, representations and selected reactions of monosaccharides; approaches to the chemical synthesis of oligosaccharides
5) Nucleic Acids: chemical synthesis of nucleosides, oligonucleotides and analogues.

Expected Course Outcomes:

- Students will be able to describe, define, identify (including stereochemical elements) and name common amino acids, nucleosides and monosaccharides.
- Students will learn the basic principles and applications of protecting group chemistry and solid-phase methods and apply this knowledge to propose reasonable synthetic approaches to oligomeric biomolecules.
- Students will learn to analyse complex biomacromolecules and outline their synthesis.

- Students will communicate solutions to questions related to the synthesis of biomacromolecules in clear, rational terms, explain and defend their answers and learn to evaluate and critique others' solutions.

Course Materials:

There is no required textbook; your previous organic chemistry textbooks will provide a solid background. Various other sources will be used throughout the course and citations given at the time. Journal articles may be assigned for reading and discussion. Notes will be written on the chalk board and you are responsible for taking/making your own notes. Some supplements will be handed out when needed (e.g. overly complex drawings).

Evaluation:

Tutorials/Assignments. Five in-person tutorials are scheduled throughout the term.

Questions for discussion will be distributed; solutions must be submitted thorough OWL prior to start of the tutorial to receive credit for having completed the assignment. In addition to the submitted solutions, both attendance of the tutorial and participation in the discussion counts toward the grade.

Tutorials/assignments, 3% x 5:	**15%**
Tentative dates:	
Friday, Jan. 17, Protecting group chemistry Friday, Feb. 7, Peptide chemistry Friday, Mar. 14, Carbohydrates Monday, Mar. 31, Nucleic Acids Friday, Apr. 4, Summary and Review	
In-Class, Midterm Test, 2 x 50 min.	
Friday, Feb. 14 (protecting groups and peptides):	**20%**
Monday, Mar. 17 (carbohydrates):	**20%**
Final Exam (3 hour), cumulative, date set by Registrar:	**45%**

Policies

Student absences and missed work. Students who are unable to meet their academic responsibilities due to medical or compassionate reasons may submit a request for academic consideration. Note that all accommodations for missed work, regardless of who grants them, are subject to the Conditions required to pass the course.

Missed assignments. There are no make-up assignments. If you miss an assignment and are granted consideration, the weight of the missed assignment will be transferred to the Final Exam.

Missed midterm test. If you miss a midterm test and are granted consideration, the weight of the midterm will be transferred to the Final Exam. If you miss both midterm tests, a cumulative make-up test will be offered.

Late assignments. Late assignments are not accepted. Students with disability accommodations who ask for a longer extension will be excused instead.

Use of electronic devices. No electronic devices (calculators, cell phones, laptops, tablets, cameras, etc.) are permitted during tested components.

Fair evaluation. All students will be treated equally and evaluated using the same criteria described in this course outline. Private requests for reweighting of marks, additional assessments, special arrangements, etc. will not be entertained.

Missed final exam. When a student misses the Final Exam and their Academic Consideration has been granted, they will be allowed to write the Special Examination. See the Academic Calendar for details (under Special Examinations).

Accommodation policies. Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing at https://academicsupport.uwo.ca/accessible_education/index.html

Scholastic offences. The University will take all appropriate measures to promote academic integrity and deal appropriately with scholastic offences. For definitions of what constitutes a scholastic offence, see https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf