

The course will cover selected topics in biochemistry, chemical biology and biophysics. The goal is to expose students to 1) the tools designed by chemists and biophysical chemists to investigate biological systems and 2) strategies to solve biological inquiries.

Upon completion of this course, the student will be able to:

1. demonstrate knowledge of chemical tools that are used to explore biological systems
2. search, read and understand scientific literature
3. summarise scientific findings on a particular research topic
4. raise an hypothesis and strategize the available research tools to probe it
5. demonstrate communication skills
6. demonstrate the ability to work with peers toward a goal e.g. gathering literature research on a particular research topic and presenting to peers.

## LECTURES

*Time:* T/Th 10:00 am

*Place:* 115 Chemistry Building

*Books:* There is no particular text book recommended for this class. The lectures are designed based on the state-of-the-art research published from well-known research laboratories around the world.

### PART I

Enzymatic reactions: Tools in studying enzyme mechanisms; Enzymes in literature.

Learning outcomes: Learn about the enzyme mechanism and understand the strategies of studying the enzymes mode of action.

### PART II

Chemical Biology: Chemical genomics; Protein chemistry.

Learning outcomes: Learn what is chemical biology and understand the design of chemical molecules to study the function of proteins in vivo.

### PART III

Biophysical methods in studying biological systems: Fluorescence Microscopy, Fluorescence Anisotropy, FRET, Circular Dichroism, Mass-Spectrometry.

Learning outcomes: Learn about a number of biophysical tools and understand their use in studying biological processes in cell.

### PART IV

Presentation of a selected topic/subject in the areas touched on in the Parts I to III.

Students will form groups of four and each group will select a topic/subject to present (in the form of power point presentation) in the class. The topic could be on a particular technique developed to study biological systems or about the research carried to investigate a human disease or find a treatment for a human disease.

Students should present what is known on the particular topic/subject they have chosen and come up with a proposal to address outstanding questions on that topic/subject. Couple of papers will be discussed by me in the course in order to prepare for the presentation.

Learning outcomes: Learn to read scientific publications, communicate knowledge; understand strategies to solve biological inquiries and prepare a scientific presentation on a particular topic. Learn to work with others toward a common goal and

### **Quizzes and Final Exam**

There will be a quiz after each Part, worth 15% (three quizzes).

In the part IV students will receive a “group” grade for their literature presentation (15%).

Final Exam (40%). The final exam is cumulative

Note: The make-up quiz, for those that missed the quiz (provided that they have a doctor’s note), will be in a week from the missed day. There will be no weight shift for a missed quiz to the final exam. Students will be asked to opt off the final exam if they are satisfied with the mark at the end of the three quizzes and the presentation. If the final mark is in the grey zone, e.g. it is 79.5 (B+) and the student aims for an A, they will be requested to take the final exam, otherwise the final grade will be a B+ (this is only an example).

### **Tentative quiz/exam dates:**

Quiz 1: October 1

Quiz 2: October 22

Quiz 3: November 12

Presentations: November 24 and 26 presentations

Final Exam: TBD Contact info: [dgkotra@yorku.ca](mailto:dgkotra@yorku.ca), Office hours: 11:30 am to 12:00 pm

Tue/Thur, CB115.