

Course Syllabus

BCH 4116 Analytical Biochemistry/ BIM 4316 Modern Bioanalytical Chemistry, Winter 2020

Course Overview

This course is an overview of modern bioanalytical and biochemical instrumental techniques with particular emphasis on the analysis of proteins and nucleic acids. Analytical Biochemistry (or Bioanalytical Chemistry) is the foundation of many advances in biology and at the chemistry-biology interface. It includes the new fields of genomics, proteomics, metabolomics, and interactomics. Advances in the biomedical sciences would be much less remarkable without the ability to detect and quantitate small amounts of biomolecules, determine the composition and interaction of multi-components in biological samples. The lectures cover the fundamental theory and practical aspects of spectroscopic methods, quantitative polymerase chain reaction, enzyme coupled immunoassays, Western, Northern and Southern blotting, SDS-PAGE, SPR, capillary electrophoresis, flow cytometry and protein mass spectrometry. Besides, some exciting applications of new bioanalytical techniques for the discovery of biopharmaceuticals, aptamers, and biomarkers will be discussed. The laboratory of BIM course teaches skills in qualitative and quantitative analysis of biomolecules.

Course Schedule

Lecture*	Tuesday	11:30-12:50	800 King Edward (STE)	Room: B0138
Lecture*	Friday	13:00-14:20	800 King Edward (STE)	Room: B0138
Laboratory**	Wednesday	13:00-16:50	150 Louis Pasteur (STM)	Room: 216
Laboratory**	Friday	08:30-12:20	150 Louis Pasteur (STM)	Room: 216

*Combined Lectures: BCH4116 and BIM4316

**Labs for BIM4316. First lab starts on Wednesday, January 15th or Friday, January 17th.

Instructor

Professor Maxim Berezovski

Office:

Address: D'Iorio Hall (DRO), Room: 201

Phone: 613-562-5800 ext. 1898

E-mail: Maxim.Berezovski@uottawa.ca

Web page: <http://mysite.science.uottawa.ca/mberezov/>

Office Hours:

14:30-15:30 Fridays

Required Items

For BCH4116 and BIM4316

1. Echo360 Free Online Account for Lecture Slides and In-Class Activities. Use the link - <https://echo360.org.uk/section/eb8f7f80-8525-4b6e-8351-70ed5694af7a/public>

For BIM4316

1. Lab Manual
2. Safety glasses and a lab coat
3. Two bound notebooks (hard cover or spiral bound), a calculator, a permanent marker, a ruler

Grades

BCH4116:

First assignment (12.5 pts, 2.5%, based on lectures 1- 6, open book). Time: Tuesday, January 28th, 8:30 – 23:30, Place: online on Echo360

Midterm Exam (150 pts, 30 %, closed book, based on lectures 1-11). Time: Friday, February 14th, 13:00 - 14:20, Place: STE, Room: B0138

Second assignment (12.5 pts, 2.5%, based on lectures 12-16, open book). Time: Time: Friday, March 13th, 8:30 – 23:30, Place: online on Echo360

Final exam (300 pts, 60 %, based on all lectures, closed book, TBA)

Class Activity (25 pts, 5%, count correct answers only, online on Echo360)

Course Total: 500 pts (100%)

BIM4316:

Midterm Exam (150 pts, 15 %, closed book, offline). Time: Friday, February 14th, 13:00 - 14:20, Place: STE, Room: B0138

Final exam (300 pts, 30 %, closed book, offline, TBA)

Class Activity (50 pts, 5%, count correct answers only, online on Echo360)

Laboratories (500 pts, 50%)

Course Total: 1,000 pts (100%)

Lectures

The lectures include the theory and applications of special analytical techniques relevant to biomolecules. Lecture slides will be posted on Echo360 and uOttawa Brightspace.

Lectures #1, 2 – Protein Analysis

Lecture #3 – ELISA

Lectures #4, 5 – Flow Cytometry

Lecture #6 – FRET

Lecture #7 - Fluorescent Polarization & Circular Dichroism

Lecture #8 – Surface Plasmon Resonance

Lectures #9, 10, 11 – Protein Separation

Lectures #12, 13, 14, 15, 16 – Protein Mass Spectrometry

Lectures #17, 19, 20 – DNA Analysis

Lecture #18 – Nucleic Acid Isolation

Lectures #21, 22 – Aptamers

Lecture #23 – Capillary Electrophoresis

Labs

Laboratory work is a requirement to pass BIM4136 course. You can choose either Wednesday's or Thursday's session. You have to finish five experiments. If you are unable to attend the laboratory session, you must provide a medical certificate to move your experiment to the next session.

Experiment 1. (2 weeks) Protein Quantitation by UV-VIS Spectrophotometer

Experiment 2. (2 weeks) Quantification of Ovalbumin in Egg White by Indirect ELISA

Experiment 3. (2 weeks) Flow Cytometric Study of Human Leukemic Lymphoblast Cell Cycle Synchronization

Experiment 4. (1 week) Determination of an Equilibrium Dissociation Constant of Protein-DNA Interaction by Fluorescence Polarization Assay

Experiment 5. (2 weeks) Detection of Bacterial DNA in Saliva by Polymerase Chain Reaction