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Approvals Summary

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Version No.	Departmental Curriculum Committee	Departmental Meeting	Departmental Chair	Other Faculty	Curric/Academic Committee	Faculty	SCTP	Version Status
4								Approved by Departmental Chair Edited by: Josie D'Amico on: Feb 18 2015
3			Approved Albert Berghuis Meeting Date: Feb 12 2015 Approval Date: Feb 12 2015 View Comments					Approved by Departmental Chair Edited by: John R Silvius on: Feb 12 2015
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BIOC 220 'Laboratory in Biochemistry 1' - Course Syllabus

Basic Course Information

BIOC 220 (Laboratory in Biochemistry 1) will be a 3-credit course that teaches essential laboratory skills in biochemistry research. The course consists of four hours of introductory 'basic skills' and safety lectures, one two-hour lecture preceding each new experiment (six in all - some experiments span multiple weeks) and one 5-hour laboratory session per week for ten weeks.

Prerequisites: BIOL 200; CHEM 222 is recommended.

Co-requisite: BIOC 212

Restrictions: Not open to students who have taken %,2&U%IOL 301. For students in Biochemistry programs, others with permission of instructor.

Course Coordinator: Dr. Imed Gallouzi (McIntyre Medical Science Building, Rm. 915B; tel. 514-398-4537; Email: imed.gallouzi@mcgill.ca.)

Textbook: There will be no textbook associated with this course. Students will be provided with a laboratory manual that describes the experimental procedures, data collection and analysis for each laboratory session.

Grading: 50% of the course mark will be based on grading of laboratory reports and 50% based on a final examination.

Course Description for Calendar

An introduction to key methodologies for the isolation, detection and characterization of proteins, lipids, nucleic acids and subcellular fractions, including spectrophotometry, assays of enzymatic activities and chromatographic and electrophoretic methods. Analysis of biochemical data.

Course Description and Objectives

BIOC 220 will provide an introduction to basic biochemistry laboratory techniques including quantitative methods for reagent preparation and data analysis, spectrophotometry, enzymatic assays, purification of proteins and DNA and analysis of proteins, nucleic acids and lipids.

Each laboratory session will consist of 25-30 students per day (based on current enrolment in BIOC 300D) and will be supervised by two teaching assistants. A two-hour lecture will be presented before each new experiment. Weekly laboratory sessions will be five hours in length. Following completion of each experiment (some of which will comprise more than one laboratory session), students will prepare and submit reports comprising these sections: ***1)*** an Introduction, outlining the rationale behind the experiments and their goal; ***2)*** a Results section, providing a narrative description of the experimental procedure and the results obtained (supported by suitable figures /graphs and quantitative data analysis); and ***3)*** a Discussion describing how the results compare to those predicted and how they fits within the current state of knowledge in the field. As noted above, beyond describing experimental protocols, the laboratory manual will guide students in collecting and analyzing their findings

Laboratory safety

All students will be given a mandatory WHMIS course offered by the Environmental Health and Safety Office, as well as a lecture about laboratory safety (including handling of biohazardous materials), before the first laboratory session. Teaching assistants will ensure compliance with all applicable safety regulations at all times. Students will be required to purchase lab coats and safety glasses and to wear them at all times in the laboratory.

Detailed list of Experiments

Introductory Lectures:

(1) Introduction to Data Analysis and Statistics
(2) Safety Protocols and WHMIS

Experiment 1: Basic Essential Skills in a Biochemistry Laboratory *(1 week)*

Accurate measurement and dispensing of liquids and solids using volumetric and gravimetric methods; accurate preparation of solutions, including buffers for biochemical research. Spectrophotometric determination of analyte concentrations. Data analysis will include calculations of the average, standard deviation and standard error of replicate measurements as well as graphical presentation of data including experimental error/uncertainty.

Experiment 2: Enzyme Kinetics and Data Presentation *(1 week)*

Spectrophotometric determination and analysis of kinetics of the enzyme -galactosidase, with particular emphasis on proper analysis and presentation of quantitative data.

Experiment 3: Subcellular Fractionation, Marker Enzymes and Western Blot *(2 weeks)*

Separation and characterization of subcellular fractions from liver cells by differential centrifugation and assays of marker enzyme activities in the different fractions to assess their purity.

Experiment 4: Lipid Purification *(1 week)*

Use of adsorption (thin-layer) chromatography to separate and structurally analyze the different lipids found in liver cell membranes.

Experiment 5: DNA Purification *(2 weeks)*

Isolation of DNA from a biological source, characterization of its behavior in solution, and paper chromatography of nitrogenous bases derived from DNA hydrolysis.

Experiment 6: Protein Expression and Purification *(3 weeks)*

Expression, affinity purification and SDS-PAGE detection of glutathionyl-S-transferase (GST) and GST-fusion proteins expressed in *E. coli*. Demonstration of the inhibitory effects of a GST-fused form of the protein 4E-BP1 on translation of a messenger RNA

encoding the firefly luciferase protein, using the rabbit reticulocyte *in vitro* translation system and bioluminence detection.