BIOC 462 Research Laboratory in Biochemistry (6 credits)
BIOC 491 Independent Research (6 credits)

Laboratory research projects and a related written review article all performed under the supervision of a professor.

BIOC 462 (Prerequisite: BIOC 320)
Coordinator
Prof. Albert Berghuis
McIntyre Medical Building,
albert.berghuis@mcgill.ca

BIOC 491 (Prerequisite: BIOC 462)
Coordinator
Prof. Arnim Pause
McIntyre Medical Building, Room 707B
arnim.pause@mcgill.ca

Course description

These courses provide students with an introductory (BIOC 462) and more advanced (BIOC 491) genuine research experience, in which scientific methodology and collaborative teamwork are applied to a current question in Biochemistry. The research objectives, scientific significance, and expectations for the final report and essay are to be established in discussion with your supervising professor at the start of the course. Immediate supervision is typically provided by a graduate student, post-doctorate, or technician in the host laboratory and, therefore, a certain amount of variability will necessarily result from lab to lab. Each project, however, will embody common scientific principles in the discovery process. It is very important to clearly understand the question under consideration, its relevance, and how it will be addressed experimentally. The time spent in the lab will also vary from project to project (reflecting the reality of experimental science), but most students will typically put in **20 or more hours per week**. It is NOT the intention of these projects to supply technical help to your supervisor, so try to get clear directions on your project and its significance.

Evaluation 462 & 491*

- Objectives and expectations: Mandatory (-5% if not submitted)
- Literature review (30%)
- Final report (35%)
- Lab performance (35%)

* With permission from the Professor, a 491 student whose project is an exact follow up of her/his 462 project **may skip the Literature Review** and rather opt for the following evaluation scheme: Objectives and expectations: Mandatory (-5% if not submitted); **Final report (50%) Lab performance (50%).**

Timetable

		Fall 2022 semester: starts Aug. 31st
Week 1	1. Mandatory Orientation 2. a) Fill out the Research Objectives and Expectations form https://www.mcgill.ca/biochemistry/files/biochemistry/objectives_and_expectations_form_fillable_396_462_491.pdf b) Once filled out email the form to Zhanna, Zhannat Sakijanova, Ms <zhannat.sakijanova@mcgill.ca>	Sept. 9th 4:30PM-5:00PM McIntyre 908 Due Mon. Sept. 19th
Week 5	Literature review essay, submitted to Professor	Due Tues. Oct 4th
Week 7	*Informal assessment of progress by the supervising Professor*	*week of Oct. 17th*
Week 13	Final Report due, submitted to Professor	Due. Nov. 29th

* The deadline for handing in the lab report is final. No extensions will be given. Reports submitted past this date may jeopardize your graduation.

Evaluation of the Literature Review Essay (30%)

The ESSAY should take the form of a review article on the background to the experiments being done in the lab. The essay should be broader and more detailed than the introduction to the report. It should cover the relevant field of research in depth, with attention paid to recent papers, experimental approaches used, and critical evaluation of published data and models. You should discuss the focus of the essay with your supervisor or principal investigator.

This review can be an extended introduction to the research project. The student should demonstrate more than superficial understanding of the experiments in the literature. A tighter focus on a limited set of relevant recent papers would be appropriate, with other background papers covered in an introduction, and a brief discussion of prospects at the end.

Format: Up to 10 single-spaced pages, including figures and references. Figures are not required, and should be used only when they help explain the text. Figures should be of a reasonable size and not fill up an entire page.

Deadline: The essay must be submitted to your principal investigator at the end of week 4. Grades will be deducted for late essays.

Grade breakdown:

Section	**Suggested criteria**	**Grade**
Introduction	• context of the essay • overall structure of the essay	15%
Literature review	• comprehensive review • recognize important papers • show in depth understanding of experiments	60%
Discussion	• explain connection to student's project • broader perspectives, potential applications	25%
References	• primary sources preferred over reviews	Mandatory, -25% if absent
Total		**100%**

Evaluation of the Final Report (35%)

The Final Report should take the form of a scientific paper with an INTRODUCTION, giving brief background, rationale for carrying out the experiments, and describing how the results might contribute to the field in general; a METHODS section describing specific techniques employed (citations of published papers may be sufficient for routine methodology); a RESULTS section in which specific data is presented; and a DISCUSSION to integrate your findings with those of the current literature (or perhaps explain what went wrong). The report should be written in a careful and scholarly style.

The report should be appropriate for 1 semester of full time research. Methods do not have to be too detailed if the techniques are standard. The results should be logically presented with rationales and conclusions. The discussion can cover technical aspects such as quality of data and experimental methods, but more importantly conceptual conclusions, what are the scientific implications of the data.

Deadline: The final paper must be submitted to the principal investigator at the end of week 13.

PI deadline: Grades and comments are to be submitted by the Principal Investigator to zhannat.sakijanova@mcgill.ca by the end of week 15, December 14th.

Grade breakdown:

Section	Suggested criteria	Grade
Abstract	• background • aim / research question • methods • results • conclusion	5%
Introduction	• context • rationale • background leading to project • aim of the project in the last paragraph	10%
Methods	• cover all of the methods used • new or non-standard methods in detail • know composition of buffers and reagents	10%
Results	• explain each experiment: rationale, procedure, conclusion • figures and tables presented clearly • complete figure legends	50%
Discussion	• reminder of aim and main findings • go beyond criticism of technical problems • discuss each result; interpretation, comparison to literature, etc. • conclusion statement and/or perspectives	25%
References	• primary sources preferred over reviews	Mandatory, -10% if absent
Total		**100%**

Evaluation of lab performance (35%)

Though the Principal Investigator is responsible for the evaluation of your lab performance, it is very likely that your immediate supervisor (lab technician, graduate student, post-doc) will give his/her opinion on your lab performance.

It is recommended that the student and Principal Investigator have a constructive discussion around the evaluation of lab performance, before the evaluation is submitted if possible.

PI deadline: Grades and comments must be submitted by the Principal Investigator to zhannat.sakijanova@mcgill.ca by end of week 15.

Grade breakdown:

Category	Examples of criteria	Grade
Theoretical knowledge	• understands purpose of reagents • understands steps of a procedure • knows principles behind experiments • predicts expected results • etc	25%
Technical skills	• proper use of equipment • prepares reagents, materials correctly • sterile technique • reproducibility of data • speed vs. carefulness • keeps good lab records • etc	50%
Behaviour	• amount of work put in • interactions with co-workers • contributes to shared lab duties • clean and organized • accepts constructive advice • etc	25%
Total		**100%**

Other comments on student:

MCGILL POLICY STATEMENTS

LANGUAGE OF ASSESSMENT/SUBMISSION:
"In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded. This does not apply to courses in which acquiring proficiency in a language is one of the objectives." *(Note: In courses in which acquiring proficiency in a language is one of the objectives, the assessments shall be in the language of the course.)*

ACADEMIC INTEGRITY:
"McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures" (see www.mcgill.ca/students/srr/honest/ for more information).

TEXT MATCHING SOFTWARE:
Text-matching software **may be** used in this course. Students shall also be informed in writing before the end of the drop/add period that they are free, without penalty of grade, to choose an alternative way of attesting to the authenticity of their work. Instructors shall provide students with at least two possible alternatives that are not unduly onerous and that are appropriate for the type of written work.

SAFE SPACE STATEMENT:
We are committed to nurturing a space where students, teaching assistants, lecturers, and professors can all engage in the exchange of ideas and dialogue, without fear of being made to feel unwelcome or unsafe on account of biological sex, sexual orientation, gender identity or expression, race/ethnicity, religion, linguistic and cultural background, age, physical or mental ability, or any other aspect integral to one's personhood. We therefore recognize our responsibility, both individual and collective, to strive to establish and maintain an environment wherein all interactions are based on empathy and mutual respect for the person, acknowledging differences of perspectives, free from judgment, censure, and/or stigma.

ADDITIONAL POLICIES
https://www.mcgill.ca/tls/teaching/course-design/outline#statements