Faculty of Science Course Syllabus  
Department of Biochemistry & Molecular Biology  
BIOC 2610.03  
Introductory Biochemistry Lab  
Winter 2020

Instructors:  
H. MacKinnon (Instructor)  heidi.mackinnon@dal.ca  Tupper 8-J2  
P. Briggs (Coordinator)  paul.briggs@dal.ca  Tupper 8-J3

Laboratories:  
B01  Monday  2:35 – 5:25 p.m.  Tupper 8-J1  
B02  Thursday  2:35 – 5:25 p.m.  Tupper 8-J1  
B03 (S)  Friday  2:35 – 5:25 p.m.  Tupper 8-J1

Course Description  
An introduction to fundamental techniques in Biochemistry through the exploration of the properties of essential biomolecules. This course is intended for students in Biochemistry & Molecular Biology and Microbiology & Immunology programs.

Course Prerequisites  
BIOL 1010.03 and 1011.03 (or equivalent), CHEM 1011.03 and 1012.03 (or equivalent), all with grades of B- or higher, or instructor’s consent.

Course Corequisites  
BIOC 2300.03 and CHEM 2401.03 and CHEM 2402.03 or instructor’s consent.

Course Objectives/Learning Outcomes  
BIOC 2610 offers the opportunity to collaborate in hands-on laboratory exercises to compile raw data for subsequent analysis. Depending on the activity, participants work in groups of 2, 8, or 24 students. The class develops transferable skills needed in science.

There are multiple formal lab reports composed in APA style with in-text citations compiled in journal submission format. The report submitted for evaluation includes a Title Page, Abstract, Introduction, Methods, Results, Discussion, Supplementary Questions, References, Table Headings Page plus Tables, and Figure Caption Page plus Figures. Students are expected to develop a formal scientific writing style. An additional problem set on Acids and Bases and the Supplementary Questions in each report are intended to extend former knowledge and revisit math skills or concepts consistent with the practical aspects of biochemistry lab work. A final exercise on Nutrition examines patient data in the context of macronutrient consumption and lifestyle with some opportunity for self-reflection. All skills work is based on collaborative effort. Social interaction is encouraged during synthesis and analysis of data. However, written work submitted for evaluation is strictly an individual effort and measures are in place to monitor student plagiarism.
Data analysis is based on algebraic relationships in biochemical concepts. Graphical analysis is performed without the assistance of a computer. Tabular presentation of blocks of data is required. Sample calculations are consistently required.

Lab techniques:
- volume handling using Gilson Pipetman and PIPETBOYacu
- spectroscopy using Spectronic 20D, Spectronic 601 and/or Biowave DNA (UV/Vis)
- titration curve of a diprotic amino acid
- protein solubility, buffering capacity, and Bradford protein assay
- DNA hyperchromic effect, viscosity, and isolation
- mass analysis of substances separated in column chromatography
- investigation of dialysis technique
- paper electrophoresis of amino acids
- analysis of effectors of enzyme activity
- reversibility of an enzyme reaction, cofactor specificity and thermodynamic values
- thin layer chromatography
- coupled enzyme assays and quantifying enzyme activity

Course Materials

Lab Manual

Textbooks

Course Website
Online course material via Brightspace: www.dal.ca/brightspace

Course Assessment

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight (% of final grade)</th>
<th>Date</th>
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<tbody>
<tr>
<td>Lab Reports (R1 – R8)</td>
<td>40% (5% each)</td>
<td>(dates in Brightspace)</td>
</tr>
<tr>
<td>Assignments (A1 – A3)</td>
<td>9% (3% each)</td>
<td>(dates in Brightspace)</td>
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<tr>
<td>Advising</td>
<td>1%</td>
<td>(week after Study Break)</td>
</tr>
<tr>
<td>Final Exam</td>
<td>50%</td>
<td>(Scheduled by Registrar)</td>
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Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A+</td>
<td>(90-100)</td>
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<tr>
<td>B+</td>
<td>(77-79)</td>
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<tr>
<td>C+</td>
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<td>D</td>
<td>(50-54)</td>
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<tr>
<td>A</td>
<td>(85-89)</td>
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<td>B</td>
<td>(73-76)</td>
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<td>F</td>
<td>(&lt;50)</td>
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<tr>
<td>A-</td>
<td>(80-84)</td>
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<tr>
<td>B-</td>
<td>(70-72)</td>
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<tr>
<td>C-</td>
<td>(55-59)</td>
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Laboratory Reports (General Marking Scheme)
Formal lab report format is based on Chapter 5 in the Making Sense for Life Sciences text (2015) and Chapter 2 in the APA Publication Manual (2010), with minor accommodations for electronic submissions and handwritten components.

Pre-Lab Preparation – 4 pts
We require that you complete the Introduction and the Methods sections of the lab report before each experiment. This practice prepares you to understand the exercises, work effectively and prevent accidents. The pre-lab is due on the day you perform the lab.

Presentation – 0.5 pt
A title page template is available online. Use APA formatting. The markers will evaluate such areas as formatting, organization, legibility, overall neatness, spelling, and grammar.

Introduction – 1.5 pts
Include any background information the reader needs to understand the paper. You must include at least one in text citation (see References section).

Methods – 1.5 pts
Start the methods section by citing the course lab manual. Continue to write out all methods. The reader should be able to replicate the experiment.

References – 0.5 pt
You must give full citation of references used as sources of information in the lab report. Include at least two references with each submission, one of which will always be the course lab manual. Only use primary sources. Format your in text citations and corresponding reference list conforming to the APA Publication Manual (2010).

Balance of Report – 6 pts
The remaining sections of your lab report are due one week following the lab. Do not resubmit the sections from the pre-lab. As you will not have an opportunity to consult with the TAs outside the lab time, leave the lab each week with a full understanding of the data analysis required.

Presentation – 0.5 pt – See above

Abstract – 1 pt
An abstract is a comprehensive summary of the entire paper.

Results – 2 pts
Includes all raw data that you obtained in lab, such as masses, absorbance readings, and other observations. Results are preferably tabulated and graphed, refer to the Appendices section for more details. Always show calculations, significant figures are always important. Have a TA verify the integrity of your raw data during the lab, if necessary we can facilitate the acquisition of raw data more consistent with expectations. If instructed to use data gathered by others, you should do your own analyses.

Discussion – 1 pt
Analyze your results and discuss their implications. Attempt to compare your results with those expected from published data or class results. Describe any drawn conclusions here.

References – 0.5 pt – See above
Appendices
Do not label this section as “Appendices”. After the References section, include the following items in order:

a) Tables – Using a word processor, tabulate experimental data (i.e., pH, masses, volumes, absorption values, etc.). Transcribe raw data as required. Include table number, title and notes. Present one table per page.

b) Figure Descriptor Page – Includes titles and descriptions of all figures. This will be the final page of your electronic document.

c) Figures – All graphs, figures, and sample calculations must be prepared by hand and included as figures, one figure per page.

Supplementary Questions – 1 pt
Supplementary questions will be distributed in lab. These questions develop biochemistry theory or practice related to lab. Use the class time to answer these questions directly on the provided sheet. Attach it to the end of your report.

Improving Writing Skills
One of the objectives of this class is to help you develop as a writer in science. Improve the quality of your writing by turning on the style and grammar checking tools of your word processing software while you write. Checking for jargon, readability, passive voice, and use of the first person, for instance, will help you develop your writing competence. Making Sense for Life Sciences (2015) and the APA Publication Manual (2010) both include sections on scholarly writing style. Review these areas.

Other Course Requirements
You are encouraged to review relevant sections in an introductory biochemistry course textbook to extend your knowledge of the work being considered and provide a suitable background for understanding the results you obtain. Many of you may be familiar with other sources of information that you would prefer to use. Please do so.

Students work in pairs in the lab, but all reports and assignments are to be an individual effort. Bring your lab manual and a calculator to each lab. Graph paper and rulers are available in lab.

Written Final Exam
You are responsible for understanding the concepts and details mentioned throughout the lab manual and in the PowerPoint presentations. You should be critical of experimental details; every step is important and carefully chosen. Rewording of supplementary questions and assignments will test your understanding. In general, you should be able to interpret raw data, diagrams, tables, and graphs that demonstrate and build on what you have seen in the lab. Knowing what content is relevant is part of the assessment, consider this when studying.
Course Policies

Policy Statements
In the event that non-compliance with the program adversely impacts the well-being of a member of the University, the supervisor (lab instructor or professor) will be responsible for intervening to achieve compliance.

Use of Animals in Biochemistry
From the University Undergraduate Calendar, Biochemistry: "Although no exercise involves live animals, experiments may use materials derived from animal sources, as well as from plants and micro-organisms."

Scent-Free Policy
Dalhousie University’s scent-free policy will be strictly enforced. As it relates to you, “staff, faculty, students and visitors are requested to refrain from using scented personal care products” such as soap, perfume, hairspray, cologne, aftershave and deodorants. Non-compliant individuals will be escorted from the lab and a mark of zero will be recorded for that experiment. To the extent practical, Dalhousie University will provide a scent-free indoor environment.

Attendance
Attendance in the lab is mandatory. Students are required to attend the section they are registered for. Experimental work must be completed within the scheduled time, there will be no makeup labs. No additional assessments will be given for extra credit.
Absence Policy
You must email the course instructor(s) prior to any absence.

Absence for a non-medical reason is not generally acceptable except in extenuating circumstances. Elective arrangements such as travel plans is not an extenuating circumstance and will not be accommodated. Alternate coursework arrangements are at the discretion of the course instructor(s). All accommodations must be arranged with the course instructor(s) prior to the deadline. A student who misses an evaluation component, for which no satisfactory arrangement has been made, will be given a mark of zero for that component.

Long-term Absence
For absences greater than three [3] consecutive days, a student must notify the course instructor(s) prior to the absence and provide original written documentation within three calendar days following the last day of absence. Acceptable documentation may include a note from a primary care health professional or other appropriate documentation depending on the situation.

Short-term Absence
Dalhousie University recognizes that students may experience short-term illness or distress resulting in absences of three [3] consecutive days or less. A student must notify the course instructor(s) prior to the absence and complete a Student Declaration of Absence form (see below).

Student Declaration of Absence (SDA) Forms
Upload your completed SDA form to the appropriate submission folder in Brightspace for the course within three calendar days following the last day of absence. A student may submit a maximum of two separate SDA forms per course during a term. Students who exceed this limit are strongly encouraged to meet with an advisor. In cases of recurring short-term absences, it is at the instructor(s)’ discretion to disallow further SDAs and deny alternate coursework arrangements. The submission of an SDA form does not provide an automatic exemption from any academic requirements that were missed or late during an absence.

An SDA form cannot be used for extensions to submission deadlines, you have one week to complete each assignment/report. In cases of an absence on the deadline day, the electronic copies of your submissions are still due by the original deadline. Scan any handwritten components (graphs, figures, etc) and also upload these to Brightspace online before the deadline.

Final Exam
Requests for an alternate final examination time are only granted in exceptional circumstances, such as an illness with a sufficient medical certificate. If necessary, a make-up final examination will be held shortly after the end of the official exam period, and before May 1st. Students who need to write a makeup exam are expected to be available during this period.

Dalhousie University Policy
https://www.dal.ca/dept/university_secretariat/policies/academic/missed-or-late-academic-requirements-due-to-student-absence.html
Paper & Electronic Submissions
You must submit both a paper copy and an electronic copy of each lab report submission before the posted deadline for full value. **Late submission of either the paper or the electronic copy will result in a mark of zero for that assignment or report.** Any variation between the electronic and paper versions will also result in a mark of zero on that component.

There will be no reconsideration of a returned graded assignment or report beyond one week.

**Paper hardcopy submission**
Every student will submit paper copies of their completed assignments and reports to the submission box outside Tupper 8-J1, no later than 2:35 pm on the due date. In accordance with the University mandate to use paper economically, students are encouraged to print double-sided (an exception to APA guidelines).

**Electronic soft copy submission**
Every student will also submit electronic copies of the textual components of lab reports to the appropriate folders in Brightspace, no later than 2:35 pm on the due date. Use Microsoft Word to prepare your document in `.doc` or `.docx` format. Your file name should conform to the structure `netID-R1-b.docx`. The electronic submissions will be screened for plagiarism using the Urkund tool integrated within Brightspace. Submissions suspected of any academic integrity offense will be investigated and could result in a loss of all value for that component.

Handwritten or drawn components are not required to be submitted electronically, but will be accepted.

Do not submit assignments (A1-A3) electronically, unless otherwise noted, neither is the structure as well defined.

**University Closure and Deadlines**
In the event of a University closure on the deadline day, the electronic copies of your submissions are still due by the original deadline. Scan any handwritten components (graphs, figures, etc) and also upload these to Brightspace online before the deadline. Your paper copies will be due the next day the University reopens, no later than 2:35 pm.

**Zero Tolerance Late Policy**
Refer to Brightspace for all current due dates. There is a zero tolerance policy for any late paper or electronic submissions (1 min = late).

| Late work will not be accepted after the posted deadlines, no exceptions. |
Policy on Plagiarism – Department of Biochemistry & Molecular Biology

What is plagiarism?
“Dalhousie University defines plagiarism as the presentation of the work of another as if it were one’s own”†. Plagiarism is a form of academic fraud. The Department is committed to protecting honest students against the devaluation of their work by students who resort to plagiarism.

Some examples of plagiarism include (but are not restricted to):

- Submitting as your own work any material created, in whole or in part, by someone else, including material created in collaboration with other students, unless specifically allowed by the course instructor and credited appropriately.
- Paraphrasing extensively or copying from sources such as the Internet, journal articles, or books (including textbooks) without crediting the original author or source.
- Using another student’s laboratory data, unless specifically allowed by the course instructor and credited appropriately.
- Submitting, in whole or in part, any work that has been submitted in another course, or re-submitting the same work in different years of the same course.

How can plagiarism be detected?
If required by the Instructor, work submitted for credit must be submitted in electronic as well as hard copy form. Submissions may be screened by one or both of the following methods:

- A pattern recognition program that compares all submissions with one another as well as submissions from previous years. Every individual has a unique pattern of writing. This program will detect submissions that are derived from a common source, even if words or phrases have been changed.
- A third-party computer-based assessment system that compares submissions against a large database including previous submissions and Internet sources.

What are the consequences of plagiarism?
“Plagiarism is a serious academic offence which may lead to loss of credit [‘F’ in a course], suspension or expulsion from the University, or even the revocation of a degree.”† At Dalhousie University, the Department is obligated to refer any cases of suspected plagiarism to the Senate Discipline Committee, which will then conduct a hearing to evaluate the innocence or guilt of students alleged to have committed an act of plagiarism.

How can accusations of plagiarism be avoided?
You can avoid accusations of plagiarism by:

- Preparing all submissions independently and ensuring that they are expressed in your own unique writing style.
- Never sharing any written or electronic material with other students. You may discuss ideas with other students but you may not work with another student while preparing materials you are planning to hand in.
- Acknowledging any material paraphrased extensively or copied from sources such as the Internet, journal articles or textbooks. Paraphrasing of short phrases from the course textbook need not be acknowledged.
- Guarding all your work, both drafts and final submissions, to ensure that no one else can copy it. If you provide access to your work and someone copies it, then you may have to appear before the Senate Discipline Committee to establish that you are the original creator of the work. If you suspect that someone has taken any of your work, notify your course instructor immediately.
- Using only laboratory data that you actually collected in the lab. Altering laboratory data is not permitted. If your data are unusable, you must still report your own data along with any explanation as to why the data are unusable. You may then use data supplied by the lab instructor for analysis, but you must acknowledge such use.

† Dalhousie University Undergraduate Calendar, 2019/2020, p. 42
Adopted May 1st, 2006
Faculty of Science Course Syllabus (Section B)
BIOC 2610.03

University Policies and Statements
This course is governed by the academic rules and regulations set forth in the University Calendar and by Senate

Academic Integrity
At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity.
Information: https://www.dal.ca/dept/university_secretariat/academic-integrity.html

Accessibility
The Advising and Access Services Centre is Dalhousie’s centre of expertise for student accessibility and accommodation. The advising team works with students who request accommodation as a result of a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (Canada and Nova Scotia).
Information: https://www.dal.ca/campus_life/academic-support/accessibility.html

Student Code of Conduct
Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don’t follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner—perhaps through a restorative justice process. If an informal resolution can’t be reached, or would be inappropriate, procedures exist for formal dispute resolution.

Diversity and Inclusion – Culture of Respect
Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness.
Statement: http://www.dal.ca/cultureofrespect.html

Recognition of Mi’kmaq Territory
Dalhousie University would like to acknowledge that the University is on Traditional Mi’kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit or e-mail the Indigenous Student Centre (1321 Edward St) (elders@dal.ca).
Information: https://www.dal.ca/campus_life/communities/indigenous.html

Important Dates in the Academic Year (including add/drop dates)
https://www.dal.ca/academics/important_dates.html

University Grading Practices
https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html

Missed or Late Academic Requirements due to Student Absence (policy)
https://www.dal.ca/dept/university_secretariat/policies/academic/missed-or-late-academic-requirements-due-to-student-absence.html
Student Resources and Support

Advising
General Advising: https://www.dal.ca/campus_life/academic-support/advising.html
Science Program Advisors: https://www.dal.ca/faculty/science/current-students/academic-advising.html
Indigenous Student Centre: https://www.dal.ca/campus_life/communities/indigenous.html
Black Students Advising Centre: https://www.dal.ca/campus_life/communities/black-student-advising.html
International Centre: https://www.dal.ca/campus_life/international-centre/current-students.html

Academic supports
Library: https://libraries.dal.ca/
Writing Centre: https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html
Studying for Success: https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html
Copyright Office: https://libraries.dal.ca/services/copyright-office.html
Fair Dealing Guidelines: https://libraries.dal.ca/services/copyright-office/fair-dealing.html

Other supports and services
Student Health & Wellness Centre: https://www.dal.ca/campus_life/health-and-wellness/services-support/student-health-and-wellness.html
Student Advocacy: https://www.dsu.ca/dsas

Safety
Biosafety: https://www.dal.ca/dept/safety/programs-services/biosafety.html
Chemical Safety: https://www.dal.ca/dept/safety/programs-services/chemical-safety.html
Radiation Safety: https://www.dal.ca/dept/safety/programs-services/radiation-safety.html
Scent-Free Program: https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html