



BIOL2910WA

LABORATORY BIOLOGY

Thursdays and Fridays, 2:30-5:30 (6 hours per week)

Centennial Building, CB3012

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**This syllabus is valid for the course offered on the Thunder Bay campus,
2022 Winter Session.**

Teaching Assistants:

Biographies posted on MyCourseLink:

Banchamlak Kassaun, PhD. Biotechnology Candidate: bkassaun@lakeheadu.ca

Courtney Ferris, MSc. Biology Candidate: cferris1@lakeheadu.ca

Course Description: Introduction to basic laboratory techniques: pipetting, preparation of media, aseptic technique, cell disruption, protein purification and analysis, electrophoresis, chromatography. Development of skills in such areas as: laboratory note-keeping, reporting, graphical presentation of data, information searching.

Credit Weight: 0.5 FCE

Offering: Winter 1,5 (6 total hours each week)

Note: An additional fee (see Miscellaneous Fees) is required for this course.

Texts and Materials:

- **Basic Bioscience Laboratory Techniques**, Bonner & Hargreaves. Wiley Blackwell. 2011.
- **Making Sense In The Life Sciences, 3rd edition**, Northey & Von Aderkas. Oxford. 2019.

- **Lab Manual 2022 version:** Free PDF available on MyCourseLink. Printing of the lab manual for personal use is permitted.

Course Objectives:

At the completion of this course, students will be able to:

1. Work safely and efficiently in a Containment Level 2 Biological Laboratory.
2. Practice aseptic techniques.
3. Practice the scientific method.
4. Keep a good laboratory notebook.
5. Calculate concentrations, dilutions, and prepare biological solutions, buffers, and media for various protocols.
6. Weigh and pipette accurately and precisely.
7. Understand the importance of running quality control samples when conducting lab experiments.
8. Calculate basic statistics (means, standard deviations, significance tests) on data.
9. Prepare publishable figures and tables.
10. Conduct literature searches and write a literature review.
11. Derive research questions and form logical hypotheses.
12. Cite peer reviewed literature to support or refute findings from lab experiments.
13. Understand the theory and importance of pH and biological buffers.
14. Extract proteins and analytes of interest from tissues using various solvents and buffers. Explain why particular reagents are included in extraction solutions
15. Explain the theory of spectrophotometry and practice its application in the study and quantification of proteins.
16. Explain the theory and apply techniques commonly used to purify and identify biomolecules:
 - Centrifugation,
 - Thin Layer Chromatography,
 - Gel Permeation Chromatography
 - SDS-PAGE
 - Western blots (simplified as dot blots)
17. Explain the theory of tissue culture and apply it to a eukaryotic system (e.g. plant micropropagation).

18. Refine the skills of biology scientific writing by completing an essay, poster, and oral presentation.
19. Develop skills to collaborate with other scientists by working in groups by researching, conducting experiments, and evaluating results.
20. Witness the practice of bioscience laboratory techniques in both an applied and research setting (subject to pandemic availability).

However, due to the uncertainty with on-campus learning, some practical skills maybe replaced with theoretical or virtual demonstrations.

Grade Category Distribution:

Ethics	10%
Major reports	30%
Minor submission (quizzes, assignments)	30%
Exams	30%

Grading policies:

- **Points**

- Point grades will be maintained on MyCourseLink. See MyCourseLink for weighting of individual grade items within each grade category.
- Students are responsible for tracking their progress and notifying the instructor or technician of any transcription errors in a timely fashion.
- Descriptions of each general items in a grade category can be found in the introduction of the lab manual.
- Details for a specific item will be provided at the time an item is assigned.

- **General rules**

- Students are expected to submit their own work. Offering and accepting reports and previous exam solutions from others is an act of plagiarism, which is a serious offence. **All involved parties will be penalized according to university regulations.** Discussion amongst students is encouraged, but when in doubt, direct your questions to the professor, technician, or TA. Working together and submitting strikingly similar reports will be dealt with as plagiarism.
- Some reports and assignments are a group effort and ALL group members are responsible for the content of the final group work submitted.
- Reports and assignments are typically quick due dates to provide timely feedback to students. Adhere to the MyCourseLink Assignment box closing dates and times!
- Late penalty is 10% per day (including weekends).
- Students wishing to dispute their grades are welcome to do so. However, your ENTIRE report will be remarked and your final mark may be lower! Students must include a written request which includes specific and verifiable arguments.

- Students with SAS accommodations are to inform the instructor either in person or via SAS of any extension requirement in as timely a fashion as possible.

- **Attendance and Absences**

- Attendance and participation in lecture and lab activities are expected and will be monitored each week.
- Polls and pre-lab quizzes are one tool used to monitor attendance and participation
- The instructor, TAs, and lab technician also monitor students for safety, tidiness, technique, and collaboration with other students as part of your work ethic grade.
- In non-pandemic years, students are allowed to miss 1 day (3 h slot) during the semester due to mild illness, family issues, conference attendance, varsity/competitive athletics, etc. without penalty. Vacations, work, or other personal reasons are not valid excuses to miss academic instruction. The instructor AND your group members MUST be notified ASAP of your pending absence. The instructor/technician reserves the right to request additional documentation. Subject to pandemic revisions.
- Students are responsible for all missed work, regardless of the reason for absence. It is also the absentee's responsibility to get all missing notes, materials, and/or data and have work completed before the due dates. Extensions are rarely granted.

Due Dates

Official due dates for reports, assignments, and on-line quizzes are presented on MyCourseLink. Students are encouraged to set-up the Notifications features under their MyCourseLink settings. Simply click on your name in the top right corner of the page. You can have notifications sent to your email address and your cell phone. Check off the boxes for what notifications you wish to receive. Reminders of due dates may be presented orally during lectures or labs. If there are conflicting due dates on MyCourseLink and the lab manual, the MyCourseLink date shall be considered correct.

Student Code of Conduct

Introduction

The following are excerpts from Lakehead University's Student Code of Conduct, updated in May 2019: <https://www.lakeheadu.ca/students/student-life/student-conduct>. It is the responsibility of each student registered at Lakehead University to be familiar with the specific requirements of the degree, diploma, or certificate, which he/she plans to pursue, as well as the rules, regulations and policies of the University and of the Faculties and Departments/Schools concerned.

Lakehead University takes a most serious view of offences against academic honesty such as plagiarism, cheating, and impersonation. Penalties for dealing with such offences will be strictly enforced. A copy of the Code of Student Behaviour and Disciplinary Procedures can be found at . The Code's intent is ensure consistency and fairness for every student in the University through the consistent

application of the procedures for the adjudication of cases of student academic and non-academic misconduct. Students shall not engage in or encourage any activity or action that is contrary to the principles expressed herein. All individuals and/or groups of the Lakehead University community are expected to speak and act with scrupulous respect for the human dignity of others, both within the classroom and outside it, in social and recreational as well as academic activities.

By accepting admission to Lakehead University, every student accepts its policies and regulations and acknowledges the right of the University to take disciplinary action, including suspension or expulsion, for conduct judged unsatisfactory or disruptive and not in accordance with the principles of this preamble. Freedom to learn can be preserved only through respect for the rights of others, for the free expression of ideas, and for the law. University discipline is limited to behaviour incompatible with those standards and which adversely affects the University's attainment of its purposes and objectives.

Student Responsibilities

Students are required to act ethically and with integrity. Such behaviour includes:

1. Completing one's own original work;
2. Knowing and following the appropriate citation and punctuation methods for referencing sources of information when quoting, summarizing, and paraphrasing;
3. Asking for clarification of expectations as necessary;
4. Collaborating appropriately on assigned group and teamwork;
5. Acknowledging the contribution of others (giving credit);
6. Preventing their work from being used by others (e.g. protecting access to digital files);
7. Adhering to the principles of Academic Integrity when conducting and reporting research, and;
8. Following published examination regulations and protocols.
9. Students are responsible for their behaviour and may face penalties under this Academic Integrity Code, if they are found to be in violation of breaching Academic Integrity.

Examples of academic integrity violations include:

1. Plagiarism
2. Possession or use of unauthorized materials
3. Facilitation a breach of integrity
4. Forgery
5. Falsification

6. Interference
7. Unauthorized collaboration or communication
8. Unprofessional or inappropriate behaviour

Frequently asked questions about Academic Integrity can be found at <https://www.lakeheadu.ca/students/student-life/student-conduct/academic-integrity/faq>.

Violators of the academic integrity policies WILL result in formal sanctions, including the addition of your name to the Student Conduct Database. Copies of formal incidents are forwarded to relevant chairs and deans. Academic sanctions may include, but are not limited to mark reduction, zero on the assignment/report/test/exam, zero in the course, additional training modules.

Accommodations

Lakehead University is committed to achieving full accessibility for persons with disabilities/medical conditions. Part of this commitment includes arranging academic accommodations for students with disabilities/medical conditions to ensure they have an equitable opportunity to participate in all of their academic activities. If you are a student with a disability/medical condition and think you may need accommodations, you are strongly encouraged to contact Student Accessibility Services (SAS) and register as early as possible. For more information, please email sas@lakeheadu.ca or visit <https://www.lakeheadu.ca/faculty-and-staff/departments/services/sas>.

Course Expectations

The student's work must match the instructor's intended purpose for an assignment. While the instructor will establish the intent of an assignment, each student must clarify outstanding questions of that intent for a given assignment.

The student may not give or get any unauthorized or excessive assistance in the preparation of any work. Copying lab reports from prior years, in whole or in part, is a form a plagiarism. Your reports are subject to review with plagiarism detection software.

Online submission of, or placing one's name on an exam, assignment, or any course document that the student has not received or given inappropriate assistance in completing it and that the student has complied with the Academic Honesty Policy in that work.

Online synchronous learning

This class may have to use Zoom, Bongo, or GatherSpace as video conferencing tools for instruction and/or collaboration due to evolving pandemic restrictions. Students should follow general guidelines and meet participation expectations for online meetings.

- Use your given or preferred name as your display name.

- Be prepared to turn your microphone and camera on during the course.
- Don't use distracting or inappropriate profile photos or virtual backgrounds. Consider using a blurring background feature. Fun bioscience backgrounds are always welcome!
- Don't share meeting links, passwords, screenshots, recordings, or other meeting information with people outside the class.
- Mute your microphone when you're not speaking to minimize background noise.
- During the lecture portion of the course it is OK to have your camera off.
- Please turn ON your microphone and video when working in small groups or asking questions. Avoid the use of the chat functions unless absolutely necessary.
- In-person lectures and labs are NOT recorded. Students should obtain notes from their classmates when they miss an exclusively in-person time slot.

Proposed Course Outline

The weekly coverage of material is subject to change, dependant on the progress of the class. For the textbook readings, BBLT refers to Basic Bioscience Laboratory Techniques and MS refers to Making Sense, Life Sciences. Keep up with the assigned readings for BBLT. The MS text chapters will aid with techniques throughout this course and in future biology courses. Ideally, read the lab manual and textbook chapter(s) BEFORE the actual lectures and labs.

ALL DATES and MATERIALS SUBJECT TO PANDEMIC CHANGES!

Dates 2022	Content
JAN 13-14	<ul style="list-style-type: none"> • Syllabus, Groups, Lab notebooks • Research skills and essay writing • BBLT text: n/a • MS text: Chapter 1, 2, 3, 11, 13
JAN 20-21	<ul style="list-style-type: none"> • Poster and oral presentation skills. • Essay writing. • BBLT text: n/a • MS text: Chapter 3, 4, 6, 8, 9, 12
JAN 27-28	<ul style="list-style-type: none"> • Pipettes, solutions, and reagent preparations. • BBLT text: Chapter 1 item MS text: Review chapters before submitting essay!
FEB 3-4	<ul style="list-style-type: none"> • pH, buffers and data presentation • BBLT text: Chapter 1, 4 • MS: Chapter 5, 10
FEB 10-11	<ul style="list-style-type: none"> • Cell and tissue culture • BBLT text: Chapter 8 • MS text: as relevant
FEB 17-18	<ul style="list-style-type: none"> • Extraction of biological materials and spectrophotometry • BBLT text: Chapter 5, 3 • MS text: as relevant
READING WEEK	NO LABS OR LECTURES!
MARCH 3-4	<ul style="list-style-type: none"> • Bradford assay and microplate readers • BBLT text: Chapter 3 • FRIDAY Bell ringer lab exam • MS: Chapter 14
MARCH 10-11	<ul style="list-style-type: none"> • Chromatography techniques • Size exclusion chromatography • BBLT text: Chapter 7
MARCH 17-18	<ul style="list-style-type: none"> • Electrophoresis, SDS-PAGE • BBLT text: Chapter 6
MARCH 24-25	<ul style="list-style-type: none"> • Immunology and Western blots • BBLT text: Chapter 6
MARCH 31-APRIL 1	<ul style="list-style-type: none"> • Thin layer chromatography • BBLT text: Chapter 7 • Lab tours
APRIL 7-8	<ul style="list-style-type: none"> • Thursday: Oral presentations • Friday: Honours thesis talks
APRIL 11-25	Final exam period excludes April 15-18