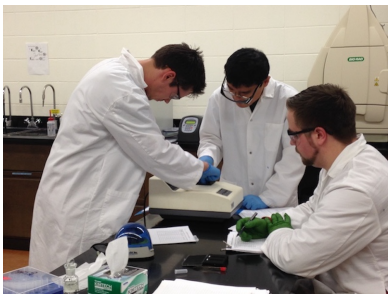
BIOL2910WA

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, 2020 Winter Session.

Teaching Assistants:
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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.

- **iClicker2** registered to an iClicker cloud account `https://app.reef-education.com/#/login`.
- **Hard Covered Lab Notebook** with bound pages.
- **Lab Manual 2020 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 micro-propagation).

18. Refine the skill of bioscience report writing through various written and video assignments.

19. Prepare a final formal report in the style of a peer reviewed bioscience journal article. Data for this report is generated over several labs.

20. Develop skills to collaborate with other scientists by working in groups both to conduct the experiment and write reports.

21. Witness the practice of bioscience laboratory techniques in both an applied and research setting.

Grade Category Distribution:

Reports, assignments, on-line quizzes	50%
Formal scientific lab report, including a literature review)	20%
Practical skills (work ethic, lab book, participation, iClickers)	20%
Bell ringer exam	10%

Course Policies:

- **Grades**
  - Grades will be maintained on MyCourseLink. See MyCourseLink for weighting of individual grade items within each grade category.
  - iClicker session grades are held in the cloud with your final mark moved to MyCourseLink.
  - Students are responsible for tracking their progress and notifying the instructor or technician of transcription errors in a timely fashion.
- **Mid-term Bell-Ringer Exam**
  - The mid-term is a practical, bell ringer style test of knowledge and skills.
  - Material covered in lectures and labs up to the time of the bell ringer may appear on this exam.
  - Calculators are not permitted. One will be available at a station if required.
  - Cell phones or other electronic devices are not permitted.
  - Water bottles, other drinks are not permitted. Hats or bulky sweatshirts are not permitted.
  - Students are to arrive at their scheduled time.
  - Formal documentation is required if you miss this exam due to extreme illness and must be provided within 48 hrs. This mid-term will be re-scheduled during the formal exam period by LU's scheduling office (Enrolment Services).
  - Students with accommodations through SAS must make arrangements with the instructor withing 72 hrs of the exam schedule being posted.

- **Reports and Assignments**
  - 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 similiar reports will be dealt with as plagarism.
  - 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 due the week the lab has been completed. Adhere to the MyCourseLink Assignment box closing dates and times!
  - The final formal report is essentially a research article and is an individual effort. This report is a substantial component of your grade and SHOULD NOT be written the night before. The due date is one week prior to the last day of classes, as per MyCourseLink Assignment box closing.
  - Late penalty for any report or assignment 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.
- **Attendance and Absences**
  - Attendance and participation in lecture and lab activities are expected and will be monitored each week.
  - iClickers are one method of monitoring 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.
  - Students are allowed to miss 1 day (3 h slot) during the semester due to mild illness, family issues, conference attendance, varsity/competetive 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.
  - 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.
- **iClickers**
  - iClicker polling will begin LAB 3 of this course. Polling may take place on Thursday and/or Fridays. Polling may take place at any time during a lecture or lab. Multiple polls during a lab or lecture may take place.
  - In-lecture questions help me gauge your understanding of the material and gives everyone a chance to participate in class.
  - iClickers are used to keep track/confirm attendance and participation. One mark is assigned for answering a question and a second mark is available for the correct answer.

- Lowest scores WILL NOT be dropped.
- You must create an iClicker account at `https://www.iclicker.com`. You MUST enter your name, student ID, LAKEHEAD email, and iClicker remote ID before scores will be registered.
- You may need to set the frequency on your iClicker prior to each polling event. Ensure your name appears on the roster during polling events.
- This course is not officially supporting the app functionality. If you purchase the remote, you do not need WiFi. Students purchasing a new iClicker maybe offered a free app trial period, but we cannot guarantee it will work in the scheduled classroom. You can use the app to track your performance and scores without purchasing a subscription.
- Bringing and using a fellow student's iClicker to class is considered cheating and a violation of the University's Academic Misconduct Policies. If you are caught with a remote other than your own or have votes in a class that you did not attend, you will forfeit ALL clicker points and face additional santions under the Academic Integrity Policy (see below). All students involved will be written up as per the LU misconduct policy.

Due Dates

Official due dates for reports, assignments, and on-line quizzes are presented on MyCouseLink. 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 exerpts 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 ones 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. Part of this commitment includes arranging academic accommodations for students with disabilities to ensure they have an equitable opportunity to participate in all of their academic activities. If you think you may need accommodations, you are strongly encouraged to contact Student Accessibility Services (`https://www.lakeheadu.ca/current-students/student-services/accessibility`) and register as early as possible. are in accordance with the terms of the Ontario Human Rights Code (`http://www.ohrc.on.ca/en/ontario-human-rights-code`). This occurs through a collaborative process that acknowledges a collective obligation to develop an accessible learning environment that both meets the needs of students and preserves the essential academic requirements of the course.

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.

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.

Dates 2020	Content
JAN 9-10	• Syllabus, Working safely, lab notebooks, research and literature reviews. • BBLT text: n/a • MS text: Chapter 1, 2, 3, 11, 13 • SET-UP EXPERIMENT FOR FORMAL REPORT.
JAN 16-17 or 23-24	• Pipettes, standards, spectrophotometry, calibration curves • BBLT text: Chapter 1, 3, 4 • MS text: Chapter 5, 6, 10 • ALTERNATE WEEK IS IN THE LIBRARY; RESEARCH SKILLS
JAN 30-31	• Quality control, pH, buffer preparation • BBLT text: Chapter 1 • MS text: Chapters 1–11 should be reviewed
FEB 6-7	• Protein extraction, centrifugation, dilutions, Bradford assay • BBLT text: Chapter 5 • MS text: as required for reports
FEB 13-14	• Size exclusion chromatography • BBLT text: Chapter 7
READING WEEK	NO LABS OR LECTURES!
FEB 27-28	• Cell and tissue culture, media prep and micropropagation of plants • BBLT text: Chapter 8 • MS text: as required for reports
MARCH 5-6	• THURSDAY Bell ringer midterm exam; help with exams in MS Chapter 14! • FRIDAY Work on formal reports; Drop date
MARCH 12-13	• SDS-PAGE; BBLT text: Chapter 6
MARCH 19-20	• Immunology and Western blots; BBLT text: Chapter 6
MARCH 26-27	• Thin layer chromatography, HPLC, GC/MS • BBLT text: Chapter 7 • Formal scientific report DUE SATURDAY at MIDNIGHT!
APRIL 2-3	• Thursday: Applied lab tour (TBay regional hospital labs) • Friday: Research lab tour (NOSM)
APRIL 3	Biology and APLS Honours Thesis Presentations! FREE FOOD!
APRIL 6-20	Final exam period; excludes April 10–13. Bell-ringer if required.