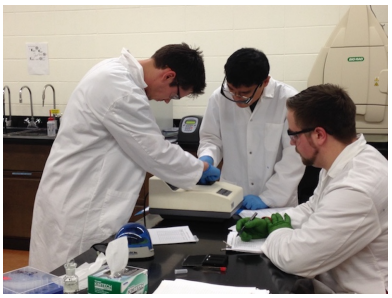
BIOL2910WA

LABORATORY BIOLOGY

Mondays and Tuesdays, 2:30-5:30 (6 hours per week)

Centennial Building, CB3012



Dr. Susanne E. Walford

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This syllabus is valid for the course offered on the Thunder Bay campus, 2019 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 hours/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 2019 version**: PDF freely available on MyCourseLink. Printing of manual is allowed.

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 and prepare biological solutions, buffers, and media from stocks.
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 skill of bioscience report writing through various 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, quizzes	50%
Formal lab report	20%
Practical skills (includes work ethics, attendance, lab book, participation)	20%
Bell ringer exam	10%

Course Policies:

- **Grades**
  - Grades will be maintained on MyCourseLink. See web site for weighting of each grade item within each grade category.
  - iClicker session grades will be held in the cloud with the 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 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.
  - No make up exam will be given.
  - 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.
  - Students with accommodations through SAS must make arrangements with the instructor within 48 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.
  - Some reports and assignments are a group effort and all members are responsible for the contents 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 class/lab.
  - 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 during the semester due to illness, without penalty. The instructor AND your group members MUST be notified ASAP. 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.
- **iClickers**
  - iClicker polling will begin LAB 2 of this course. Polling may take place on Mondays and/or Tuesdays. Polling may take place at any time during a lecture or lab.
  - In-lecture questions help me gauge your understanding of the material and gives everyone a chance to participate in class.
  - They are used to keep track of attendance. One mark is assigned for answering a question and a second mark is available for the correct answer.
  - The lowest two scores will be dropped to account for times you forget to bring your clicker to class or experience technical problems.
  - 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 before polling begins.
- This course will not be supporting the any app functionality. You do not need the app or WiFi. Students purchasing a new iClicker maybe offered a free app trial period, but we cannot guarantee it will work in the scheduled classroom.
- 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 may face additional disciplinary action.

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.

University Policies

Introduction

The following are excerpts from the Lakehead University's University Regulations (`http://csdc.lakeheadu.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=25&chapterid=7015&loaduseredits=False`) Section IX Academic Misconduct, and the Code of Student Behavious and Disciplinary Procedures (`https://www.lakeheadu.ca/faculty-and-staff/policies/student-related/code-of-student-behaviour-and-disciplinary-procedures`). 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.

Academic Misconduct

Academic misconduct includes, but is not limited to:

1. Plagiarism (see University Regulation IX of the Calendar for definition), including, but not limited to, submitting a work of which the student is not the author, in whole or in part, whether written, oral or in any other form (except for duly cited quotations or references). Such work may include a thesis, an academic paper, a seminar presentation, a test, an examination, a laboratory or technical report.
2. Cheating of any kind.
3. Presenting research data that have been falsified or concocted in any way.
4. Attributing a purported statement of fact or reference to a source that has been concocted.
5. Submitting the same piece of work or a significant part of that work for more than one course, or a thesis or other work which has already been submitted elsewhere, without written authorization of the instructors concerned and/or of the academic unit concerned. falsifying an academic evaluation, misrepresenting an academic evaluation, using a forged or falsified academic record or supporting document, or facilitating the use of a falsified academic record or supporting document.
6. Undertaking any other action for the purpose of falsifying an academic evaluation.
7. Disruption of academic activities during a class or component of a course.

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 is a statement of academic honour 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. You should keep up with the assigned readings for BBLT, whereas the MS text chapters will aid you throughout this course and in future biology courses. In addition to lecture material, ensure you read the lab manual and text chapter(s) BEFORE the actual lecture/lab!

Dates 2019	**Content**
JAN 7-8	• Syllabus, Working safely, Lab notebooks, Research and literature reviews • BBLT text: n/a • MS text: Chapter 1, 2, 3, 11, 13
JAN 14-15 or 21-22	• Pipettes, standards, spectrophotometry, calibration curves • BBLT text: Chapter 1, 3, 4 • MS text: Chapter 5, 6, 10
JAN 28-29	• Quality control, pH and buffers • BBLT text: Chapter 1 • MS text: Chapters 1–11 should be reviewed
FEB 4-5	• Cell and tissue culture, media prep and micropropagation of plants • MS text: as required for reports
FEB 11-12	• Protein extraction, centrifugation, Bradford assay • BBLT text: Chapter 5 • MS text: as required for reports
READING WEEK	NO LABS OR LECTURES!
FEB 25-26	• SDS-PAGE • BBLT text: Chapter 6
MAR 4-5	• MONDAY Report writing help: MS Chapters 1–11 • TUESDAY Bell ringer midterm exam: MS Chapter 14
MAR 11-12	• Immunology and Western blots • BBLT text: Chapter 6
MARCH 18-19	• Size exclusion chromatography • BBLT text: Chapter 7
MARCH 25-26	• Thin layer chromatography, HPLC, GC/MS • BBLT text: Chapter 7 • Formal report help! Review MS text Chapters 1–11!
APRIL 1-2	• Monday: Research lab tour (NOSM) • Tuesday: Applied lab tour (TBay regional hospital labs)
APRIL 5	Biology and APLS Honours Thesis Presentations! FREE FOOD!
APRIL 8-18	Final exam period: NONE FOR THIS COURSE!