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Laboratory Biology

Biology 2910 | Winter 2020

This document is available on D2L/myCourselink.

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Learning objectives

The goal of this course is to create a meaningful and creative laboratory experience for students who are interested in exploring experimental biology, and give you the skills necessary to work or study in many other related areas, such as medicine, environmental studies, forensics or biotechnology.

At the end of this course, you should be able to:

- Work safely in the lab
- Perform various laboratory techniques using DNA and protein, including
 - Pipetting
 - Weighing
 - Spectrometry

- Buffer preparation
- Tissue collection and homogenization
- Centrifugation
- Chromatography
- Antibodies to detect proteins
- Electrophoresis
- Biomacromolecule purification, identification and characterization
- Perform laboratory experiments
- Write formal lab reports by applying information obtained in lecture, from your textbook and from other scientific sources to the data you obtain in the lab
- Work effectively as a member of a research team
- Keep effective records of your work in the laboratory
- Find information necessary to do laboratory work using the university library
- Understand common terms used in laboratory biology
- Feel comfortable asking questions based on the scientific content of your and others' work
- Discuss topics relevant to laboratory biology, which may include genomics, protein structure, and array technology

Office hour

I don't offer preset office hours; if you want to discuss anything about the course, talk to me either in the lab or email me to set up a face to face appointment.

Contacting me

Please use the LU email address above to contact me, not the email within D2L. I will check my email daily Monday to Friday, and will try to respond to your questions as quickly as possible during those days.

Lectures and labs

All sessions take place in OA3002.

Lecture/ Tutorial/ Review: Fridays 10:00am -11:00am in OA 3002

Lab sessions: (1) Tuesdays 2:30pm-5.30pm; (2) Thursdays 11:30am -1:30pm; both in OA 3002

Note that this course is listed in the academic calendar as “1,5”, meaning that each week there are 5 hours of lab work (spread over 2 lab sessions) and a 1-hour lecture/tutorial.

Lectures will not introduce new material but will be review sessions based on what you covered that week in the lab sessions. We will also do some practice problems to hone your calculation and logic skills prior to writing up your labs and writing the final exam in April.

Usha and I post all course information in D2L; new info will be in the Announcements section. It's up to you to regularly check D2L for information. I will send emails to the class only for urgent matters (e.g., class cancellation).

Note that the 2020W study break is Feb. 17 to 21. There will thus be no labs or lectures during that week.

[Calendar description](#)

Biology 2910 | Laboratory Biology

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

Offering:

0-0; 1-5

Notes:

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

Course Classifications:

Type C: Engineering, Mathematical and Natural Sciences

Textbook

There is no official textbook; I will give you required readings by posting the material online.

Marking scheme

Lecture material and laboratory modules will be posted on the course D2L site. Every attempt will be made to cover relevant materials prior to each lab, but this may not always be possible.

The major emphasis in the course is on lab skills, this is reflected in the course marking scheme below:

Component	Value (% of final mark)	
	Original outline	Revised outline
2 Experimental reports* (15% for 1st, 25% for 2nd)	40	40
3 Techniques reports* (3 x 5%)	15	15
Pre-lab quizzes**	15	15
Lab book	5	0
Lab technique and participation	5	5
Final test on theoretical content of the course	20	20
TOTAL	100	95***

Notes:

*Format and expectations for both types of reports are outlined in the **lab write up** module. Any assignment handed in late will have 5% of its grade deducted for each day late. Please follow the lab schedule and outline to see what type of report each lab exercise has. Students can choose to submit 2 Experimental reports and 3 technical reports which will be graded.

** Before each lab, there will be a quiz based on the pre-lab questions that tests your preparation for the lab.

*** The final % mark calculated according to this scheme will be divided by 0.95 to give a final course mark out of 100%.

Material placed on reserve

One copy of *Basic Bioscience Laboratory Techniques: A Pocket Guide* by Bonner and Hargreaves is on overnight reserve at the library (on University Ave.). Information available on the D2L site under “reserves”. Any readings I assign will either be freely available online or I will post them on the course D2L site.

Final exam

Date TBA. Covers material from the 1-h Friday lectures only.

Laboratory schedule

Week	Date	Tuesday Lab 2:30pm -5:30pm	Thursday Lab 11:30am -1:30pm	Report type
1	7 January	Lab Orientation; WHMIS; Lab Safety Safety Quiz		
	9 January		Excel Graphing and Report Writing	
2	14 January	Pipetting, measuring, Balance Prelab Quiz#2		
	16 January		How to make solutions, pH, molarity,	Technical Report Lab#2 (due 28 th Jan)
3	21 January	Prelab Quiz#3 Chlorophyll pigment measurement		Experimental Report Lab#3 (due Feb 4th)
	23 January		Chlorophyll pigment measurement continues	
4	28 January	Prelab Quiz#4 Protein extraction/ Bradford assay		Technical report Lab #4 (due Feb 11 th)
	30 January		Protein quantification	
5	4-February	Prelab Quiz#5 Protein utilization experiment		

	6-February		Protein utilization experiment	Experimental Report Lab #5 (25 th February)
6	11-February/13-February	Prelab Quiz#6 Size exclusion Chromatography		Technical Report Lab#6 (due March 4 th)
7	25 February	Prelab Quiz#7 Protein extraction and Gel electrophoresis		
	27February		Coomassie gel staining	Experimental Report Lab #7 (due March 18 th)
8	4-March	Lab #7 -Protein Extraction continues– Western Blot		
	6- March		Immunodetection	
9	11- March	Prelab Quiz#8 DNA - PCR lab		
	13- March		PCR; gel Electrophoresis	Technical Report#8 (due March 25 th)
10	18- March	Review		
11	25- March	Reports due		

Lectures

Lectures will not introduce any new material but instead will be a tutorial session focusing on:

- reviewing the previous week's lab work to help you fully understand concepts and write your lab reports, and
- previewing what to expect in the next week's lab sessions.

These sessions are a no-pressure place for you to tell me if you are having trouble understanding the material. If so, we will go over it together.

Statement on academic integrity:

The full version of Lakehead University's policy on academic integrity is available online at <https://www.lakeheadu.ca/faculty-and-staff/departments/services/provost-vice-president-academic/academic-integrity-plans-policies/academic-dishonesty-regulations>.

This policy makes up part of the Student Code of Conduct – Academic Integrity, available online at <https://www.lakeheadu.ca/students/student-life/student-conduct/academic-integrity>.

All students in this course should read these policies and become familiar with them.

In summary, the penalty for plagiarism or cheating on any part of this or any other course is a mark of **zero** for the work where the student is caught. Serious or repeated plagiarism, including cheating on an examination or test, will result in a mark of zero for the course and may result in expulsion from the University.

For the purposes of this course, there are in particular several places where cheating may occur:

1. using written or electronic notes or through conferring with another person in a test or examination;
2. voting electronically in place of another person for the participation component of the course;
3. handing in written work that is in whole or in part not your own.

Note that the presence of a student's iClicker REEF polling device app in the classroom when the student is not present will result in a participation mark of **zero**.

To ensure academic fairness for students who work hard, rest assured that the course instructors will take **every precaution** to ensure that potential cheaters are caught and subjected to the appropriate penalty.