



## Laboratory Biology

Biology 2910 | Winter 2017

This document is available on D2L.

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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**

Wednesdays 10:30–11:30 AM in OA 3018. Otherwise, I am available by appointment via email.

**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**

Fridays 11:30-12:30 in OA 2010

Lab sessions: (1) Mondays 2:30-5:30; (2) Wednesdays 8:30-10:30; both in OA 3002

Lectures are generally available for download from D2L on the evening prior to the lecture.

I post all course information in D2L; announcements will be made in “News”. It’s up to you to regularly check the course website for information. I will send emails to the class only for urgent matters (e.g., class cancellation).

Note that the 2017W study break is Feb. 20 to 24. 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:

<b>Component</b>	<b>Value (% of final mark)</b>
2 experiment reports* (15% for 1st, 25% for 2nd)	40
Techniques reports* (3 x 5%)	15
Pre-lab questions**	15
Lab book	5
Lab technique	5
Participation***	5
Final test on theoretical content of the course	15
<b>TOTAL</b>	<b>100</b>

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.

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

\*\*\* See “Student participation” section below for details.

### **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.

### **Student participation:**

Much of the participation will be done using a “clicker” system. You will need to buy the “REEF Polling for i>clicker app” for your smartphone, tablet or laptop, and bring your device with the app on it to each class. This is for answering questions in class and for getting participation marks in the course.

In both the Android and i-tunes store, search for "REEF Polling by i>clicker", download and install it. To link your app to the course, search for both the lecture and lab components at Lakehead-Orillia: “BIOL 2910” and “BIOL 2910 lab”. Then add both to your list of courses. The cost is either \$20.99 for a 6-mo subscription, or \$32.99 for a year. I will use this app next fall for my BIOL-3470: Biotechnology of Plants course, so if you are planning on taking it, it makes more sense for you to pay for the year subscription. Since students are located on 2 campuses, you cannot use a physical i>clicker.

Note that 5% of your final mark is allocated to participation. This will be based on: answering questions that are based on the lecture and lab material during lectures and labs. This will be equally allocated for attendance, and correct answers. You may miss a maximum of 2 of the lectures without penalty.

Additional information on the technology will be given in the first class.

### **Course schedule**

**Laboratory Schedule**

<b>Week</b>	<b>Date</b>	<b>Monday Lab 2:30-5:30</b>	<b>Wednesday Lab 8:30-10:30</b>	<b>Report type</b>
1	9- January	Lab Orientation; WHMIS		
	11- January		Lab Safety	Practical /Quiz
2	16- January	Pipetting, measuring, balance		
	18- January		How to make solutions, pH, molarity,	Practical/ Quiz
3	23/25- January	Excel graphing	Report writing	
4	30- January/1- February	Chlorophyll pigment measurement		Experimental report
5	6-February	Protein separation/ Bradford assay		
	8-February		Protein quantification	Technical report
6	13-February/15- February	Protein utilization experiment		Experiment
7	27-February	Protein fractionation		
	1-March		ELISA	Technical
8	6-March	Gel electrophoresis		
	8- March		Western blot	Experimental
9	13- March	DNA purification		
	15- March		DNA purification	Technical
10	20- March	DNA enzyme digestion		
	22- March		DNA Gel Electrophoresis	Technical
11	27- March	PCR		
	29- March		PCR/Gel Electrophoresis	Experimental

12	3- April	Review		
	5- April		Report(s) due	

**Lecture schedule (Fridays)**

Week	Date	Content
1	Jan. 13	Introduction; lab notebooks
2	20	Library; graphing
3	27	Tissue disruption, crude separations, centrifugation, chromatography
4	Feb. 3	Research presentation
5	10	Protein purification and characterization
6	17	Protein research; antibodies as experimental tools
7	Mar. 3	Antibodies as experimental tools; ELISA
8	10	Gel separation of biomacromolecules; western blotting
9	17	DNA separation purification and separation
10	24	Polymerase chain reaction
11	31	Test
12	Apr. 7	Research presentation

Note: The order of the labs and lectures is subject to change.

**Statement on academic dishonesty**

The full version of Lakehead University's policy on academic dishonesty is available [online](#). This policy makes up part of the [Code of Student Behaviour and Disciplinary Procedures](#). All students in this course should read this policy and become familiar with it.

In summary, the penalty for plagiarism or cheating on any part of this or any other course is 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 two places where cheating may occur:

- (a) using written or electronic notes or conferring with another person in a test or examination, and
- (b) using a clicker other than your own when participating in class and lab.

Academic dishonesty for any of these areas will result in a mark of **zero** for the work concerned. Rest assured that the course instructors will take **every precaution** to ensure that potential cheaters are caught and subjected to the appropriate penalty.