

## Course outline

### Biology 1050: Introduction to cell and molecular biology

#### FAB section

2023F

#### THE BASICS

- Lecturer: Dr. David Law
- Office: OA 3004 (in Orillia)
- email: [dlaw@lakeheadu.ca](mailto:dlaw@lakeheadu.ca)
- Office hour: No scheduled office hour; make an appointment by email to talk with me on Zoom.
- Phone: None; make an appointment by email to talk with me on Zoom.

Use either the lakeheadu.ca email address above or the email within D2L to contact m. I will check my email daily Monday to Friday, and will try to respond to your questions as quickly as possible during those days.

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#### Class info

Biology 1050 lectures and labs are offered in-person.

All course material is posted on MyInfo/D2L; check there for the latest course updates and information.

#### Lectures

- K building, room 325
- Wednesdays, 11:00 AM - 2:00 PM

#### Labs

- M building, room 313
  - Thursdays, 12 noon - 3:00 PM
  - All lab information is on the separate BIOL-1050-FB1 D2L site
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## [Calendar description](#)

### **Biology 1050 Introduction to Cell and Molecular Biology**

An introduction to the chemical, cellular and molecular processes that enable organisms to be alive. The definition of life; the scientific method; the chemistry of life; the structure and functions of cells; photosynthesis and cellular respiration; cell division and sexual reproduction; the functions of nucleic acids and proteins; and biotechnology in agriculture and medicine. Lecture concepts are reinforced through hands-on exercises in laboratory sessions.

- Credit Weight: 0.5
- Offering: 3-3; 0-0
- Course Classifications: Type C: Engineering, Mathematical and Natural Sciences

*Notes:* Students who have previous credit for Biology 1130 cannot take Biology 1050 for credit. An additional fee (see Miscellaneous Fees) is required for this course.

*Instructor's note:* under "Offering", (a) "3-3" means 3 hours of lectures plus 3 hours of labs a week; (b) "3-3; 0-0" means that the course is offered in the fall term only; winter term courses will have numbers after the semicolon.

## LEARNING OUTCOMES

### During this course, you will...

- improve and expand your critical understanding of major concepts in cell and molecular biology, including
  - diversity and evolution
  - development
  - reproduction
  - classification
  - biochemistry
  - ecology
- develop both hard and soft biological skills, such as
  - working with your peers
  - conceiving, writing and delivering written work by applying information obtained in lecture, from your textbook and from other scientific sources

### By the end of this course, you will be able to...

- use common biology terms
- use library resources to find scientific literature on biology
- recognize the properties common to all organisms
- understand how the control of chemical reactions is critical for organisms
- describe how the structure of cells allows them to regulate their metabolism
- identify the biochemical pathways in cells that allow them to obtain energy
- describe how plants use light energy to power life on Earth
- describe how cells reproduce by dividing their genetic and cytoplasmic material
- discuss how sexual reproduction is critical for evolution by natural selection
- outline how cells selectively translate DNA sequences into proteins
- describe the uses of biotechnology in agriculture and medicine

## **IN-PERSON LECTURES**

All of my lectures will be delivered in-person. Occasionally, I may need to teach via Zoom instead. I'll provide a link to the Zoom session in Calendar on the right hand side of the D2L course homepage.

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### **Be courteous and participate in class**

We should all try to be patient and kind to others during lectures. I appreciate feedback letting me know what does and doesn't work. Speak up right away so I can attempt to fix any issue you may have.

I ask a lot of questions during lectures. I welcome volunteers to answer. I also plan to call on students by name to answer some simple questions during class, so be prepared for that. This isn't to embarrass you but rather to make you more comfortable participating in group work and offering your opinion in front of others, both of which will be a major part of your university life and future career.

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### **Do the review questions in the breakout groups**

I will end each lecture with some relevant questions. We'll answer these in breakout groups of around 4 to 6 students each. One person per group will answer their question. I'm not expecting perfect answers but want you to think about the questions and answers. While I do not mark your group's answers to the breakout question you are assigned in class, there's a good chance that similar questions will appear on the midterms and final exam, so participating in the breakout groups is excellent prep for doing well on the tests.

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### **Attend lectures to receive participation marks**

You have to be present during lectures to participate in the iClicker questions and receive participation marks.

## LECTURE AND LAB SCHEDULE

### Lectures:

Following is a **preliminary** lecture schedule. Lectures are generally available for download from D2L on the evening prior to the lecture.

Note that the 2023F Georgian study break is M October 23 to F October 27.

The course includes a final exam based on the lecture material, written during the normal fall exam period in December; date and time is TBA.

The *CoB* readings (in green boxes below) are required; the *EB* (except where required for the labs) and *B2e* readings (slightly greyed out below) are optional.

Week of	Topics	Reading (chapter/section...)		
		Concepts of Biology	Exploring Biology	Biology 2e
Sept. 4	Course welcome			
	Introduction to biology; the scientific method	• 1	• 1	• 1
Sept. 11	"			
	The chemistry of life	• 2	• 4 intro • 5 intro	• 2
Sept. 18	"			
	Cell structure and function: cell theory; prokaryotes and eukaryotes; endosymbiosis	• 3.1 • 3.2 • 13.2	• 5 intro • 6 intro • 6.1 • 8 intro	• 4.1 • 4.2
Sept. 25	Midterm #1: Wed. Sept. 27			
	How cells obtain energy: cellular respiration	• 4 intro • 4.1 • 4.2 • 4.3	• 10	• 7
Oct. 2	"			
	Photosynthesis: how plants build the living world	• 5	• 9	• 8
Oct. 9	"			
	Reproduction at the cellular level: mitosis	• 6.1 • 6.2	• 11	• 10
Oct. 16	The cellular basis of inheritance: sexual reproduction and meiosis	• 7.1 • 7.2	• 12	• 11
	Focus on plants: Unicellular autotrophs	• 13.1 • 13.3: Protist diversity; protists as food sources	• 20.2	• 23 intro • 23.1 • 23.2 • 23.3 (chlorophytes) • 25.2
Oct. 23	Fall study break (no classes)			
Oct. 30	"			
	Midterm #2: Wed. Nov. 1			
Nov. 6	Focus on plants: Land plant evolution; seedless vascular plants	• 14 intro • 14.1 • 14.2 intro, bryophytes, mosses	• 21	• 11.2 (alternation of generations) • 25.3 (non-vascular plants)
	"			
Nov. 13	Focus on plants: seedless vascular plants	• 14.2: vascular plants; seedless vascular plants	• 22 intro • 22.4 (Phylum Pterophyta)	• 25.4
	"			
Nov. 20	Molecular biology	• 8	• 14	• 14.2 • 14.3 • 14.5 • 14.6 • 15.1 • 15.3 • 15.4 • 15.5
	"			
Nov. 27	Biotechnology	• 9	• 15	• 17.1 • 17.3 • 17.4 • 17.5
	Final exam review			

**Labs:** See your lab schedule and content at the BIOL-1050-FO1 D2L site.

## LEARNING MATERIALS

Learning materials for this course include things you must buy and free internet resources.

You have 2 things to buy:

- The laboratory manual *Exploring Biology in the Laboratory*, Murray P. Pendarvis and John L. Crowley (third edition, 2018), Morton Publishing, Englewood, CO, USA. You can buy either the paper version (ISBN 978-1-61731-755-2) from the [Lakehead bookstore](#) (CAD 143) or elsewhere (e.g., at [Amazon](#)), or the e-version (eISBN-13: 9781617317569) for CAD ~80 from [Redshelf](#) or [Google Play](#). Note that most of you will also use this lab manual next term in BIOL-1051: Intro to ecology and biodiversity and so you'll need to access it until the end of April 2023; I thus recommend buying rather than renting.



- The [iClicker Student mobile app](#) for your mobile device: ~CAD 22 for the fall term. Once you've installed it, link it to the course by searching for my name at the Lakehead University-Orillia campus and choosing **BIOL-1050-FAO: Intro to cell and molecular biology**. This will get you ready to participate and receive marks for

the in-class polling that will start in the first class on Wednesday, Sept. 7. See further info below for how this works under “Student participation”.

We will use an OpenStax textbook in the lecture portion of the course, which is online and free:

- [Concepts of Biology](#). Senior contributing authors Samantha Fowler, Rebecca Roush and James Wise (2021). Digital ISBN-13: 978-1-947172-03-6.



There is also an optional, more advanced version of this textbook (also online and free) that we will occasionally consult, especially when talking about plants:

- [Biology 2e](#). Senior contributing authors Mary Ann Clark, Texas Wesleyan University; Matthew Douglas, Grand Rapids Community College; Jung Choi, Georgia Institute of Technology

Digital ISBN-13: 978-1-947172-52-4





## MARKING SCHEME

- Midterm exam 1: **15%**
- Midterm exam 2: **20%**
- Final exam: **20%**
- Course participation: **5%**
- Labs (more details in lab D2L site): **40%**

## STUDENT PARTICIPATION

All course participation will be done using the **iClicker Student** app for your smartphone/tablet/computer/other device. Buy it in either the [Android or iOS app store](#).

Bring either your device with the app on it to each class. You will use it to answer questions in class and receive participation marks.

To link your app to the course, search for the course under my name at Lakehead-Orillia: "BIOL-1050-FAB: Intro to cell and molecular biology". Then add it to your list of courses. The cost is around CAD 22 for a 6-mo subscription.

Previously, students have asked me to choose a free polling app (e.g., the basic version of Top Hat; Kahoot!; Zoom polling) rather than a paid version. I have researched many of them and found that iClicker Student best meets my and your need for participation tracking, user friendliness and reliability.

Five percent of your final mark is allocated to participation. In each lecture, you will use the clicker to answer questions that are based on the course material using the iClicker during my lectures. The 5% participation mark will be equally weighted for

- attendance (2.5%), and
- correct answers (2.5%).

Therefore, to receive a high participation mark, you have to be both physically and mentally present in class.

You may miss 3 lectures without penalty to your participation mark. For example, if there are 15 classes where we vote with iClicker, you need to be present for 12 of these to receive full credit for attendance. Additional information on the technology will be given in the first class.

## ACADEMIC DISHONESTY

Lakehead has a [Student Code of Conduct – Academic Integrity](#). All students in this course should read the Code and become familiar with it.

To summarize the relevant parts of the Code, 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 Lakehead.

There are three particular places in this course where cheating might occur:

1. submitting written work that you did not research and write;
2. using written or electronic notes to confer with another person in a test or examination; or
3. voting electronically in place of another person using the iClicker Student app.

Academic dishonesty for any of these areas will result in a mark of **zero** for the work concerned.

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.