

Course outline
Biology 3330
Molecular biology of development
2023W

THE BASICS

Instructor: Dr. David Law

- Office: OA 3004 (in Orillia)
- Email: dlaw@lakeheadu.ca
- Office hour: No set office hour; email me to make an appointment to talk in person or via Zoom.
- Call me: Dr. Law or David

Teaching assistant: N/A

- Email: N/A

Lectures

Our class runs from Mon. Jan. 9 to Wed. Apr. 5, 2023.

We meet Mondays and Wednesdays, 10:00 to 11:30 AM in the telepresence room (Orillia: OA 2020; Thunder Bay: AT 5041).

Important dates

Take note of the following other [important dates](#), as per the [academic schedule of dates](#):

- Final date to add a course for 2023W: Fri. Jan. 20
- Final date to withdraw from a course without academic penalty (a/k/a drop date): Fri. March 10
 - I aim to provide you with at least 25% of your final mark by this date so that you can make an informed decision about your progress and projected future performance in the course.

LEARNING OUTCOMES

During this course, you will

- Develop “hard” scientific skills in developmental biology, molecular biology and comparative biochemistry that logically follow from your previous courses in lab biology, cell biology and biochemistry
- Develop “soft” scientific skills, such as
 - conceiving, writing and delivering oral presentations by applying information obtained in lecture, from your textbook and from other scientific sources
 - developing job-searching techniques and learning what you can do with an undergraduate degree in biology

By the end of this course, you will be comfortable

- Understanding common terms used in developmental biology
- Discussing experimental model organisms amenable to the study of developmental biology
- Discussing common cross-species themes in
 - The regulation of gene expression
 - Biochemical changes during development
 - Adaptive responses to abiotic and biotic stresses
 - Recognizing specific examples of the concepts above using plant and animal models
- Discussing several experimental laboratory methods used to examine the above questions, such as
 - Cell culture
 - Epigenetics
 - Protein:protein interactions
 - DNA and protein detection techniques
- Preparing and delivering oral presentations
- Asking questions based on the scientific content of others' presentations
- Discussing hot topics in molecular biology and biochemistry: genomics, protein structure, array technology, stem cells and genetic diseases

IN-PERSON LECTURES

All of my lectures will be delivered in-person.

The past three years of teaching remotely has taught me that 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. For example, last year a student told me my slides were blurry during our Zoom lectures... this was a consequence of me trying to improve their quality by broadcasting in 4K without considering everyone's sometimes limited internet bandwidth. If you're having a problem understanding me during in-person lectures this year, speak up right away so I can fix the issue.

Telepresence tricks

We are meeting in the telepresence room (OA 2020 and AT 5041). Our high-def video conference facility is ideal for classes offered in both Orillia and Thunder Bay. It's more immersive than Zoom and I find it an exciting place to teach. Like in Zoom, there is a split-second lag as we talk between campuses... be aware of this and generous when giving everyone time to speak.

Our classroom is mask-friendly and tries to be respiratory-virus-safe

I'm excited but slightly uneasy about in-person learning this winter; perhaps you are too. Everyone is free to mask in class; I may do so as well. As the COVID/influenza/RSV situation evolves during the winter term, I may strongly encourage masking. There is also a chance that I may move classes to Zoom rather than in-person. I hope we have a successful start to the winter term in-person.

Be courteous and participate in class

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.

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.

Attend lectures to receive participation marks

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

LECTURE SCHEDULE

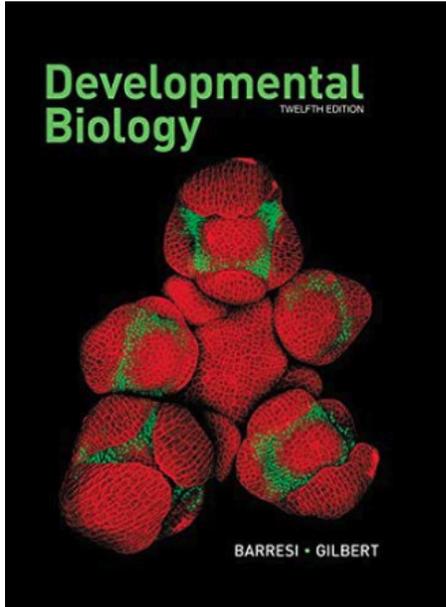
Week	Date	Material
1	Jan 9	Introduction
		Origins of developmental biology I
2	Jan 16	Origins of developmental biology II
		The roles of cells in development
3	Jan 23	The development of multicellular organisms
		Model organisms in developmental biology
4	Jan 30	<i>Drosophila</i> as a model animal organism
		The regulation of gene expression I
5	Feb 6	Midterm exam 1 (Mon. Feb. 6)
		The regulation of gene expression II: genetic switches
6	Feb 13	The regulation of gene expression III: small RNAs
		Control of transcription in eukaryotic cells
	Feb 20	Study break
7	Feb 27	<i>Arabidopsis</i> as a model plant organism
		Control of translation in eukaryotic cells
8	Mar 6	Midterm exam 2 (Mon. Mar. 6)
		Post-translational regulation of gene expression
9	Mar 13	Oral presentations session 1

		Oral presentations session 2
10	Mar 20	Oral presentations session 3
		Molecular cloning: introduction and uses in molecular biology
11	Mar 27	Principles of metabolic control
		Metabolic evolution and the origin of life
12	Apr 3	Tools for probing gene function
		Review and wrap-up

TEXTBOOKS, ETC.

I ask you to buy or access two things for the course...

1. The **course textbook** is Barresi and Gilbert's *Developmental biology*, 12th edition (2020). It's strongly recommended but not required.



You can rent the e-book for 6 mo from either

- [VitalSource](#) for CAD 82, or
- [Redshelf](#) for USD 65 or CAD 88.

If you want a printed version, [Amazon has it in looseleaf](#) for CAD 192.

If you have access to an older version, that is fine, but chapter and page numbers will likely be different. Patterson Library in Thunder Bay has the 9th edition, and the Harvie Library (500 University Ave.) in Orillia has the 11th; both are on 1-day (overnight) loan and available at the Reserves desk.

2. If you want to receive participation marks, you must buy the **iClicker app**. See details in **Participation** section below.

TEXTBOOKS ON RESERVE AT THE LIBRARY

All available on one-day (overnight) loan - ask at the circulation desk of the library.

In Orillia at Harvie/500 University Ave.:

[Developmental biology](#)

Gilbert, Scott F., 1949- author.; Barresi, Michael J. F., 1974- author.
2016; 11th edition
Orillia Harvie Legacy Library
QL 955 G48 2016

[Molecular biology of the cell](#)

Alberts, Bruce; Wilson, John ; Hunt, Tim; *et al.*
2015; 6th edition
Orillia Harvie Legacy Library
QH 581.2 M64 2015

In Thunder Bay at Patterson:

[Principles of development](#)

Wolpert, Lewis
2007; 3rd edition
Chancellor Paterson Library
QH 491 P74 2007

[Developmental biology](#)

Gilbert, Scott F., 1949-
2010; 9th edition
Chancellor Paterson Library
QL 955 G44 2010

[Molecular biology of the cell](#)

Alberts, Bruce.
2002; 4th edition
Chancellor Paterson Library
QH 581.2 M64 2002

MARKING SCHEME

- Midterm exam 1 (Mon. Feb. 6): 15% of your final mark
- Midterm exam 2 (Mon. Mar. 6): 15%
- 4 assignments @ 7.5% each = 30%
- Oral presentation: 15%
- Course participation: 5%
- Final exam (date TBA): 20%

PARTICIPATION

As with my other synchronous courses, I'll use the **iClicker Student** app to track your participation. Buy it for your smartphone/tablet/computer/other device in either the [Android or iOS app store](#).

Before the start of term, open the app and search for my name at Lakehead-Orillia. Then add **BIOL-3330-WAO/WA: Molecular biology of development** to your list of courses. The cost is around CAD 22 for a 6-mo subscription.

I recognize that using a paid participation app is not ideal. I have researched or previously used many free polling apps (e.g., the basic version of Top Hat; Kahoot!; Zoom polling) 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'll use iClicker to answer questions. 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; for example, using an artificial intelligence source like ChatGPT to answer assignment questions or provide material for your oral presentation;
2. using written or electronic notes or AI to obtain answers during a test or exam; or
3. voting electronically in place of another person using iClicker.

Academic dishonesty for any of these areas will result in a mark of **zero** for the work concerned. For example, if you cut-and-paste information from the internet to answer a written response question on a test, you will receive zero for that test.

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.