Biology 3330: Molecular biology of development
Course outline
Lakehead University
Winter 2021

1. THE BASICS

Instructor: Dr. David Law

- Office: virtual
- Email: dlaw@lakeheadu.ca
- Office hour: Tuesdays 2:30-3:00 PM in Zoom, or by email appointment.
- Call me: Dr. Law or David

Teaching assistant: Jacob Puskas

- MSc Biology student in Thunder Bay
- Email: jpuskas@lakeheadu.ca

Lectures

Classes in the 2021W term run from Mon. Jan. 11 to Mon. Apr. 12, 2019.

Our class meets Mondays and Wednesdays, 1:00 to 2:30 pm, synchronously in Zoom.

Important dates

Take note of the following other important dates, as per the academic schedule of dates:

- Final date to add a course for 2021W: Fri. Jan. 22
- Final date to withdraw from a course without academic penalty (a/k/a drop date): Fri. March 12
    - 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.

2. COURSE OBJECTIVES

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

3. ZOOM LECTURES

My lectures are live

All lectures and labs will be delivered live (synchronously) via Zoom.

This is new territory for all of us, and we should all try to be patient and kind to others during these lectures. That includes me; while I've used Zoom previously (probably like all of us), I'm still learning what works and what doesn't when teaching remotely.

Links to each lecture will be posted in advance in Calendar. You have to be signed into D2L for this link to work. This will ensure that I can see your real name in Zoom.

Be courteous in Zoom

You all likely know this, but mute your audio if you're not participating. It's up to you whether to turn on your video or not during the lecture. I'm OK either way.

Participate in class

I ask a lot of questions during lectures. I welcome volunteers to answer; turn on your video and/or audio to do so, whatever you're comfortable with. 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, which will be a major part of your university life and future career.

Do the review questions in the breakout rooms

I will end each lecture with some relevant questions. We'll answer these in breakout groups of around 2 students each. One person per group will turn on video and audio to answer their question. I'm not expecting perfect answers but want you to think about the questions and answers. Participating in the breakout rooms is excellent prep for answering similar questions that might appear on the midterms and final exam.

Ultimately, you should answer all of the questions I post to prepare for the next exam.

Attend lectures synchronously to receive participation marks

Lectures will be recorded and posted on the D2L site and thus available for you to review. However, you have to be present during the synchronous lectures to participate in the iClicker questions and receive participation marks.

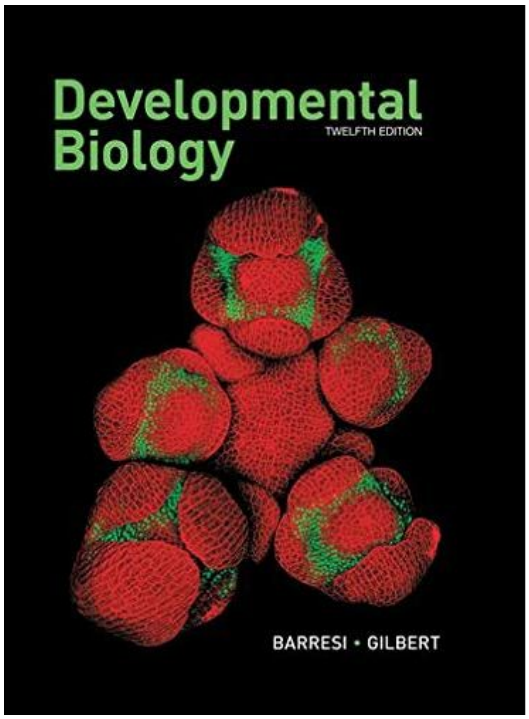
4. LECTURE SCHEDULE

Week	Date	Material
1	Jan 11	Introduction
		Origins of developmental biology I
2	Jan 18	Origins of developmental biology II
		The roles of cells in development
3	Jan 25	The development of multicellular organisms
		Model organisms in developmental biology
4	Feb 1	Drosophila as a model animal organism
		The regulation of gene expression I
5	Feb 8	Midterm exam 1 (Mon. Feb. 8)
		The regulation of gene expression II: genetic switches
	Feb 15	Study break
6	Feb 22	The regulation of gene expression III: small RNAs
		Control of transcription in eukaryotic cells
7	Mar 1	Arabidopsis as a model plant organism

		Control of translation in eukaryotic cells
8	Mar 8	Midterm exam 2 (Mon. Mar. 8)
		Post-translational regulation of gene expression
9	Mar 15	Oral presentations session 1
		Oral presentations session 2
10	Mar 22	Oral presentations session 3
		Molecular cloning: introduction and uses in molecular biology
11	Mar 29	Principles of metabolic control
		Metabolic evolution and the origin of life
12	Apr 5	(Easter Monday)
		Tools for probing gene function
13	Apr 12	Review and wrap-up

5. TEXTBOOKS, ETC.

I've adopted a dedicated developmental biology textbook this year for the first time: Barresi and Gilbert's *Developmental biology*, 12th edition.



You can rent the ebook from VitalSource for 6 mo for C$60.

If you want a printed version, Amazon has it in looseleaf for $188.

We will be using Zoom polling during lectures. This will save you the $22 iClicker fee for renting that app for a term.

6. MARKING SCHEME

- Midterm exam 1 (Mon. Feb. 8): 15% of your final mark
- Midterm exam 2 (Mon. Mar. 8): 15%
- 4 assignments @ 7.5% each = 30%
- Oral presentation: 15%
- Course participation: 5%
- Final exam (date TBA): 20%

7. STUDENT PARTICIPATION

All course participation during lectures will be assessed using the **polling** function within Zoom. You don't have to do anything on your end except vote for a multiple choice question when I ask it during class.

Five percent of your final mark is allocated to participation. In each lecture, you will answer questions that are based on the course material using Zoom polling 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 poll, you need to be present for 12 of these to receive full credit for attendance.

8. 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 Zoom polling.

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.

9. IF ZOOM GOES DOWN…

If Zoom is offline during class or lab time, which happens infrequently, we will use D2L's Virtual Classroom (VC) videoconferencing instead. If we can't connect via Zoom, I'll send an email invitation within 5 min to your lakeheadu.ca email account. You can check out VC yourself within D2L; at the top of the class D2L page, go to **Other Tools** > **Virtual Classroom**. This is the same VC system most of you are familiar with from my online review sessions in previous courses. It operates much like Zoom.