

# Biology 3470-FDE and FDF

## Course outline

### 2021F

#### THE BASICS

- Lecturer: Dr. David Law
- Office: Virtual
- 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.

Please use the lakeheadu.ca 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.

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#### Class info

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

Biology 3470 is a synchronous Zoom course. The lectures are “live” but I also record them so that you can watch (and rewatch, if desired) them as many times as you like.

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#### [Calendar description](#)

##### **Biology 3470: Biotechnology of Plants**

Facts and myths surrounding plant biotechnology, domestication of modern crop plants, photosynthesis and primary assimilation of inorganic nutrients, plant growth regulators, morphogenesis, tissue culture, water relations and transport, and plant movements and directional growth.

- Credit Weight: 0.5
- Prerequisite(s): [Biology 2230](#) and [2910](#) or permission of the instructor
- Offering: 3-3; or 3-3

- Notes: An additional fee (see Miscellaneous Fees) is required for this course.
- Course Classifications: Type C: Engineering, Mathematical and Natural Sciences

## LEARNING OUTCOMES

By the end of this course, you will develop knowledge in 3 areas:

### A. Scientific concepts

- Develop a practical understanding of the cardinal importance of plant metabolism in the biosphere
- Know how plant metabolism may be manipulated to make products of high agronomic value
- Comprehend the ethics and realities of plant biotechnology
- Know techniques used for local food production, and its benefits and challenges
- Know the benefits of public education about native and exotic plants
- Enhance your ability to think critically about ethical issues surrounding food production
- Develop an in-depth understanding of key processes of plant physiology and biochemistry at an advanced level. Examples may include:
  - Photosynthesis and gas exchange
  - Water and nutrient transport and utilization
  - Energy metabolism
  - Carbon partitioning
  - Flowering and reproduction
  - Plant growth regulators and their roles as signaling molecules
  - Plant responses to stress

### B. Practical scientific techniques

- Perform plant culture and growth monitoring under a variety of conditions and with different species
- Perform statistical interpretation of results

### C. Broader learner outcomes

- Write a scientific paper in the proper format
- Write a “popular” article about a plant that is useful to people, based on information obtained during a field trip
- Read, interpret and extract useful information from a primary scientific journal article and discuss it with your peers

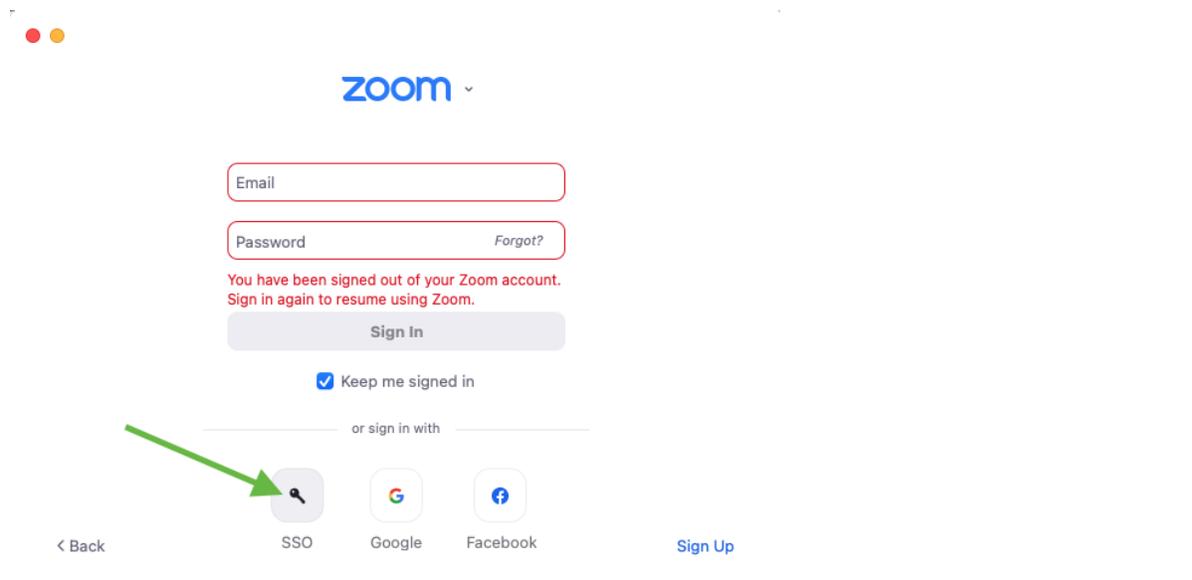
## ZOOM LECTURES

### My lectures are live

All lectures will be delivered live (synchronously) via Zoom, while the labs will be F2F (in person) in Thunder Bay or Orillia.

The past year+ of teaching remotely has taught me that we should all try to be patient and kind to others during Zoom lectures. I appreciate feedback letting me know what does and doesn't work on Zoom. For example, last year a student told me my slides were blurry during our synchronous lectures... this was a consequence of me trying to improve the quality of my lectures by broadcasting in 4K video without considering everyone's sometimes limited internet bandwidth. So if you're having a problem seeing or hearing me, speak up right away so I can fix the issue.

Links to each lecture will be posted in advance in Calendar. You have to be signed into D2L and Zoom using "Sign in with SSO" for this link to work (see below). Don't use the Email/Password boxes on this page; click the SSO button instead, which will take you to the MyInfo sign-in page. 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. While it's up to you whether to turn on your video or not during the lecture, I much, much prefer it if you do.

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## 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 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 rooms

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 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. **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 rooms is excellent prep for doing well on the tests.

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## 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.

## LECTURE AND LAB SCHEDULE

### Lectures:

- Wed. Sept. 8 to Mon. Dec. 6, 2021
- Mondays and Wednesdays, 1:00 PM - 2:20 PM
- Location: Zoom

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

Note that the 2021F study break is M October 11 to F October 15.

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

Week of	Topic
Sept. 6	
	1: Introduction
Sept. 13	2: The origins of agriculture
	3: Local food production
Sept. 20	4: Modern plant biotech techniques
	5: Plant biotech goals
Sept. 27	Catch-up day
	<b>Midterm exam #1: Wed. Sept. 29</b>
Oct. 4	6: Food crop in focus: bananas
	7: Case study: Schmeiser vs. Monsanto
Oct. 11	<b>Fall break: no classes</b>
Oct. 18	8: Mineral and nitrogen nutrition
	9: The green revolution
Oct. 25	10: Food crop in focus: the potato
	11: Organic agriculture
Nov. 1	Catch-up day
	<b>Midterm exam #2: Wed. Oct. 27</b>
Nov. 8	12: The business of plant biotech
	13: Food crop in focus: maize
Nov. 15	14: Flowering and reproduction; Terminator technology
	15: Secondary metabolites
Nov. 22	Student presentations session 1
	Student presentations session 2
Nov. 29	16: Putting it together: building a better plant
	Catch-up day
Dec. 6	Final exam review

**Labs:**

- See your lab schedule and content in the "Labs" section in D2L
- Labs start the first week of class (week of Sept. 6)

***Orillia lab section (FO1):***

- Lab location: OA 3002
- Day/time: F 2:30-5:30 PM
- Instructor: Dr. Usha Menon
- Email: [umenon@lakeheadu.ca](mailto:umenon@lakeheadu.ca)
- Phone Number: +1 705-330-4008 ext. 2988
- Office Location: OA 3003

***Thunder Bay lab section (F1):***

- Lab location: CB 3012
- Day/time: F 11:30 AM-2:30 PM
- Instructor: Christina Richard
- Email: [crichar3@lakeheadu.ca](mailto:crichar3@lakeheadu.ca)
- Phone Number: +1 (807) 343-8765
- Office Location: CB 2028A

## LEARNING MATERIALS

**Textbooks:**

There are no required textbooks for this course, and there are no physical materials (e.g., textbooks) available at the Lakehead library this term. You will likely find the following e-books available through the library useful for both the course material and when writing your oral presentation. You'll have to sign in via the library website prior to accessing these.

- [\*Plant Biotechnology and Genetics : Principles, Techniques, and Applications.\*](#) Neal C. Stewart, 2nd edition.
- [\*Biochemistry & molecular biology of plants.\*](#) Bob B. Buchanan, Wilhelm Gruissem, Russell L. Jones, eds, second edition (2012).
- [\*Plant biotechnology : current and future applications of genetically modified crops.\*](#) edited by Nigel G. Halford.

- [Plant development and biotechnology](#). Edited by Robert N. Trigiano, Dennis J. Gray.
- [Plant biology](#). Linda E. Graham, James M. Graham, Lee W. Wilcox. (2006).
- [Mauseth: Botany: An Introduction to Plant Biology 7th edn](#)

### Participation app:

The only item you have to buy for the course is the [iClicker Student mobile app](#) for your mobile device: ~CAD 22 for the fall term. See below under **Student participation** for installation and use details.

## MARKING SCHEME

Course marks are evenly split between the lecture and lab components.

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### Lecture:

- Midterm 1 - 10%
- Midterm 2 - 15%
- Final exam - 20%
- Participation - 5%
- Total for lecture: 50% of final grade

Midterms cover the lectures and supplemental material indicated. They are written using the D2L **Quizzes** tool and are 40 min long. Other details will be given in class.

The final exam will cover material between the last test and the end of the course. However, any material that students had difficulty answering on the midterm test may be included on the final. I will let you know what this material is in advance.

### Labs:

- Introductory paper - 2%
- Field trip paper - 10%
- Lab 1 - 6%

- Lab 2 - 6%
- Lab 3 - 6%
- Lab 4 - 10%
- Presentation - 10%
- **Total for labs: 50% of final grade**

## STUDENT PARTICIPATION

All course participation will be done using the **iClicker Student** (formerly known as iClicker Reef) 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.

Once you've installed the app, link it to the course by searching for **BIOL-3470-FDF: Plant Biology** under my name at **Lakehead University-Orillia**, then add it to your list of courses. The cost is around CAD 22 for a 6-mo subscription. **Both TB and Orillia students sign in using this information.** 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. 8.

I know that no-one wants to pay for polling software. 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 found that iClicker Student best meets my and students' needs 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 iClicker Student.

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.

## 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**. It operates much like Zoom.