

Biology 3470: Biotechnology of plants

Course outline

WAO section

2024W

[THE BASICS](#)

[LEARNING OUTCOMES](#)

[IN-PERSON AND ZOOM LECTURES](#)

[LECTURE AND LAB SCHEDULE](#)

[LEARNING MATERIALS](#)

[MARKING SCHEME](#)

[STUDENT PARTICIPATION](#)

[EXAMS AND DUE DATES](#)

[ACADEMIC DISHONESTY](#)

[AI USE IN COURSEWORK](#)

THE BASICS

Contact info

- Lecturer: Dr. David Law
- Office: OA 3004
- email: 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.
- Call me: David or Dr. Law

Please use the lakeheadu.ca email address above or the D2L email function to contact me. I will check my email daily Monday to Friday, and will try to respond to your questions as quickly as possible during those days.

Class info

I post all course information in D2L. New info will be in the Announcements section, so check it regularly for information. I will send emails to the class only for urgent matters (e.g., class cancellation).

The Tuesday class is in-person and the Thursday class is via synchronous Zoom.

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

IN-PERSON AND ZOOM LECTURES

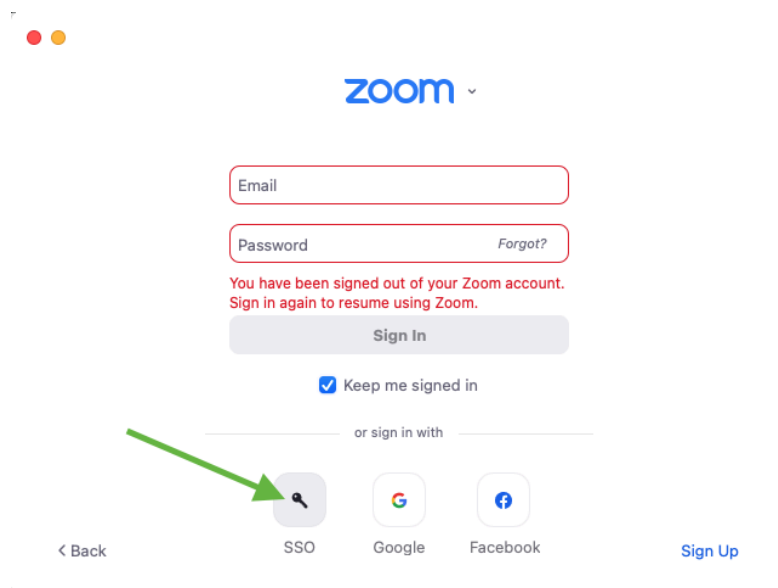
My lectures are live

All lectures will be delivered live either F2F or synchronously via Zoom, while the labs will be F2F in Orillia.

Note that I will record the Thursday lectures and post these in D2L for your later review. As with all Zoom recordings, the images and voices of students present may be recorded. These recordings are strictly confidential and may be used only by the instructor and students registered in the course only for purposes related to the course, and may not be otherwise shared or distributed. Students who are concerned about being recorded may ask me in an email to exclude them from the recording to the greatest extent possible while recognizing that this may not always be possible. These recordings are made under

the authority of sections 3 and 14 of [the Lakehead University Act, 1965](#). Questions about the collection of images and sounds in these recordings may be directed to the chair of biology, Dr. Azim Mallik (amallik@lakeheadu.ca).

I'll provide links to the Zoom sessions in Calendar on the right hand side of the D2L course homepage. 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 MyPortal sign-in page. This will ensure that I can see your real name in Zoom.



Be courteous and participate in class

You all likely know this, but mute your audio if you're not participating on Zoom. While it's up to you whether to turn on your video or not on Thursdays, I much, much prefer it if you do.

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

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.

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 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 don't 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.

Attend lectures to receive participation marks

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

LECTURE AND LAB SCHEDULE

Lectures:

- Tuesday Jan. 8 to Thursday April 4
- Tuesdays and Thursdays, 1:00 PM - 2:20 PM
- Location: OA 2015 (Tuesdays) and Zoom (Thursdays)

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

Note that the 2024W study break is February 19-23.

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

Week of		Lect.	Topic
January	8	1	Introduction
		2	Agriculture origins
	15	2	Agriculture origins
		3	Food production in Ontario
	22	4	GM crops and how to make them
		4	GM crops and how to make them
	29		Midterm exam #1: Tues. Jan. 30
		5	Bananas
February	5	5	Bananas
		6	Case study: Schmeiser vs. Monsanto
	12	7	Plant nutrition
		7	Plant nutrition
	26	8	The green revolution
		8	The green revolution
March	4		Midterm exam #2: Tues. March 5
		9	Potatoes
	11	10	Organic farming
		11	Plant biotech business
	18	12	Maize
		12	Maize
	25		Student presentations
		13	Plant growth regulators
April	1	14	Flowering, reproduction and Terminator
			<i>Last class Thurs. April 4; Catch-up day</i>

Labs:

See your lab schedule and content in the "Labs" section in D2L. Labs start Jan. 15.

- Lab location: OA 3002
- Day/time: Mondays 11:30 AM - 2:30 PM
- Instructor: Dr. Victoria TeBrugge
- Email: [Victoria TeBrugge](mailto:Victoria.TeBrugge@utoronto.ca)
- Office Location: OA 3003

LEARNING MATERIALS

Textbooks:

There are no required textbooks for this course. 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 term. See below under **Student participation** for installation and use details.

MARKING SCHEME

Lecture:

- Midterm 1: 15%
- Midterm 2: 15%
- Final exam: 20%
- Participation: 5%
- Oral presentation: 10%
- **Total: 65% of final grade**

Midterms cover the lectures and supplemental material indicated. They are written in class and are 1 h 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:

- **Total: 35% of final grade**
- See the lab marking scheme on the Labs D2L page.

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.

Once you've installed the app, link it to the course by searching for **BIOL-3470-WAO: 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. This will get you ready to participate and receive marks for the in-class polling that will start in the second class on

Thursday, Jan. 11.

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 and 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.

EXAMS AND DUE DATES

This class has a large number of deliverables: lab reports, quizzes, etc. You'll have to have good time management skills to meet deadlines. Dr. Te Brugge will let you know her policy for late lab reports and lab quizzes.

If you miss a midterm, you may write a replacement test, but you must provide acceptable supporting documentation within 48 h of the missed test to me. If required, there will be one date for a make-up test and no make-up test can be written after the test results have been returned to the class. This also applies to students registered with SAS. Missed final exams require you to follow the protocol provided by Enrolment Services.

If you're having trouble finishing coursework in the assigned time, contact me and/or SAS to find a solution.

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.

AI USE IN COURSEWORK

Before deciding to use AI to complete coursework, read Lakehead's [checklist for its appropriate use](#). If you use AI, you may violate the Lakehead [Academic Integrity Code \(Section III\)](#) and be subject to disciplinary action. It's best to check with me or Dr. Te Brugge prior to using it if you are unsure. There is no shame in doing so; we're very aware of these tools. As this technology evolves, it's up to your instructors to ensure that student marks reflect their own work. Our current solution to this challenge is to shift the marking scheme towards more work done in class like quizzes and exams.