



# **BOT\*2100 Life Strategies of Plants**

Fall 2018  
Section(s): C01

Department of Molecular and Cellular Biology  
Credit Weight: 0.50  
Version 2.00 - September 10, 2018

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## **1 Course Details**

### **1.1 Calendar Description**

This course introduces the structures and processes used by plants in the greening of our planet, and how and why plants are basic to the functioning of the biosphere. This course includes hands-on experience in examining the cells, tissues and architectures of plants as well as selected processes of plant function.

**Pre-Requisite(s):** 2 of BIOL\*1050, BIOL\*1070, BIOL\*1080, BIOL\*1090

### **1.2 Course Description**

This course introduces the structures and processes used by plants in the greening of our planet, and how and why plants are basic to the functioning of the biosphere. This course includes hands-on experience in examining the cells, tissues and architectures of plants as well as selected processes of plant function.

### **1.3 Timetable**

Lectures: 10:00-11:20 Tuesday & Thursday, **THRN 1307 (Albert A. Thornbrough Building)**

Look through the readings listed in the lecture schedule (to follow below) **ahead** of time to get the most out of this course. You can print out the notes on Courselink but these are NOT complete so you are expected to **take notes during lecture**.

Labs: 2:30-5:20 Wednesday (section 1) OR Thursday (section 2), **SCIE3304**

Make sure that you read the pertinent lab exercises **ahead** of time. Consider any questions posed in each exercise; they can help you in completing the LAB REPORTS.

You are welcome to ask any questions during lectures, the laboratories or at any other times. I welcome contact via email and am happy to set up office meetings.

### **1.4 Final Exam**

Mid-Term Exam: Tuesday October 18th (in class)

Final Exam: Friday December 6th 14:30-16:30 (Room, TBA)

## 2 Instructional Support

### 2.1 Instructor(s)

#### **Ian Tetlow**

**Email:** itetlow@uoguelph.ca  
**Telephone:** +1-519-824-4120 x52735  
**Office:** SC1 4471 (laboratory 4409)

Dr. Ian Tetlow was awarded a B.Sc. (Hons) in Plant Science from the Faculty of Agriculture at the University of Newcastle-upon-Tyne, U.K. in 1986. His Ph.D. project, undertaken at University College of North Wales (Bangor), U.K., focused on the physiological responses of plants to attack by biotrophic fungi with an emphasis on the effects of plant pathogens on plant carbon metabolism. Following his Ph.D. Dr. Tetlow began post-doctoral work at the University of Manchester, U.K. studying the regulation of carbon metabolism in non-photosynthetic plastids. Following post-doctoral studies Dr. Tetlow continued to work in the area of non-photosynthetic carbon metabolism and was awarded a Leverhulme Special Research Fellowship, followed by an Industrial Fellowship, both of which were held at the University of Manchester. In 2002 Dr. Tetlow moved to the University of Guelph and is currently an Associate Professor in MCB. Current research interests involve understanding the role of protein-protein interactions and protein phosphorylation in regulating starch metabolism in crop plants and carbon partitioning in oilseed crops. Dr. Tetlow also teaches Metabolism in the Whole Life of Plants (BOT\*4380).

#### **Tariq Akhtar**

**Email:** takhtar@uoguelph.ca  
**Telephone:** +1-519-824-4120 x54794  
**Office:** SC1 4461

Dr. Tariq Akhtar obtained a B.Sc. from the University of Waterloo and stayed to complete a MSc. in Environmental Toxicology. His research focused on how plants adapt to certain environmental contaminants. Based on this research, he was awarded the Natural Sciences and Engineering Research Council (NSERC) post graduate scholarship to pursue a PhD. at the University of Florida to find a viable and cost-effective way to overcome global folate malnutrition through plant 'biofortification'. Dr. Akhtar later began post-doctoral work at the University of Michigan studying plant volatiles, which continues to be a major focus of his research program at the University of Guelph. Dr. Akhtar also teaches Metabolism in the Whole Life of Plants (BOT\*4380). Dr. Akhtar can be contacted by email at [takhtar@uoguelph.ca](mailto:takhtar@uoguelph.ca) or at extension 54794 and his office is in the Summerlee Science Complex, Room 4461 (laboratory 4406).

### 2.2 Instructional Support Team

**Lab Co-ordinator:** Chris Meyer  
**Email:** cmeyer02@uoguelph.ca  
**Telephone:** +1-519-824-4120 x53955  
**Office:** SC1 3507

Dr. Chris Meyer obtained B.Sc. and Ph.D. degrees in Plant Biology from the University of Waterloo. He has contributed to research and teaching in the plant sciences at the Universities of Waterloo, Wilfrid Laurier and Brock. Dr. Meyer continues to explore new approaches in plant science education at Guelph. As the BOT\*2100 Lab Coordinator, he manages all aspects of the teaching laboratory. See the Lab Manual for further details.

## 2.3 Teaching Assistant(s)

<b>Teaching Assistant:</b>	Cecily Costain
<b>Email:</b>	ccostain@uoguelph.ca
<b>Teaching Assistant:</b>	Gregory MacNeill
<b>Email:</b>	gmacne01@uoguelph.ca
<b>Teaching Assistant:</b>	Matthew Carswell
<b>Email:</b>	mcarswel@uoguelph.ca
<b>Teaching Assistant:</b>	Eslin Oztur
<b>Email:</b>	eoztur@uoguelph.ca

## 2.4 Teaching Assistants

The TAs are responsible for dealing with your questions and making sure that you understand the procedures. In addition, they will be able to give you help in getting all the exercises to work.

They will grade the LAB REPORTS that are handed in at the end of laboratories (see Grades).

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# 3 Learning Resources

## 3.1 Required Resource(s)

### Lab Manual (Lab Manual)

BOT\*2100 Life Strategies of Plants, C.J. Meyer, Department of Molecular and Cellular Biology, College of Biological Science, University of Guelph, © Fall 2017.

You are responsible for bringing this manual to every laboratory. The charge also covers the cost of your project handout and other additional handouts that you will receive later in the semester.

### Courselink (Website)

<https://courselink.uoguelph.ca>

This course will make use of the University of Guelph's course website (*via* Courselink). Consequently, you are responsible for all information posted on the Courselink page for BOT\*2100. Please check it regularly.

## 3.2 Recommended Resource(s)

### Botany (sixth edition) (Textbook)

Botany, 6th Edition, 2016 by J.D. Mauseth

Available from the bookstore and on 2-hour reserve in the Library.

### Undergraduate Calendar (Website)

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/>

The source of information about the University of Guelph's procedures, policies and regulations, which apply to undergraduate programs.

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# 4 Learning Outcomes

## 4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1. Critically evaluate ideas and arguments by gathering and integrating relevant qualitative and quantitative information, assessing its credibility, and synthesizing evidence to formulate a position.
  2. Accurately and effectively communicate ideas, arguments and analyses in graphic, oral and written form.
  3. Collaborate effectively as part of a team by demonstrating mutual respect, and an ability to set goals and manage tasks and time lines.
  4. Apply scientific methods and processes to generate and interpret scientific data using quantitative, qualitative and analytical methodologies and techniques.
  5. Demonstrate knowledge in the molecular and chemical composition of plants and their relationships to structure and function.
  6. Demonstrate knowledge in the fundamental vegetative and reproductive attributes of plants.
  7. Demonstrate knowledge in the interaction of plants with biotic and abiotic factors.
  8. Demonstrate knowledge in plant diversity and genetic variability and their relationship to evolution, speciation and adaptation.
  9. Demonstrate the use of modern techniques in plant research.
  10. Demonstrate skills to study plants in field or laboratory settings.
  11. Interpret the evolutionary history of plants through an examination of phylogenetic trees.
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# 5 Teaching and Learning Activities

## 5.1 Course Content

### Lectures

Lectures will be in **THRN (Albert A. Thornbrough) Room 1307**

Lectures are on:

Tuesdays at 10:00 - 11:20 AM

Thursdays at 10:00 - 11:20 AM

The first lecture is on **Thursday September 6<sup>th</sup>**. You are most welcome to ask any questions during lectures, the laboratories, or at any other times.

### Laboratories

Laboratories will take place in Room 3304 in the Science Complex.

Laboratories are on:

Wednesdays at 2:30 – 5:20 PM

Thursdays at 2:30 – 5:20 PM

Laboratories start on **Wednesday September 19th** and **Thursday September 20th**.

Make sure that you read the pertinent lab exercises **ahead** of time. Consider any questions posed in each exercise; they can help you in completing the LAB REPORTS. **Remember that you will be examined on laboratory-based material in the mid-term and final examinations.**

## 5.2 Important Dates

September 6th: first lecture

September 19th and September 20th: first lab for section 1 and section 2 students respectively

October 18th: midterm examination

December 6th: final examination

## 5.3 Note

You will require a minimum of 6 hours of **independent study** per week (reading, checking your notes, preparing for the lab) to really get the most out of this course. You will be asked to complete a **Course/Instruction and Teaching Assistant Evaluations** using **Courselink**. The evaluation surveys and comments will be given to the instructors after final grades have been submitted.

## 5.4 Lectures

**Dr. T. Akhtar (lectures 1-11 and mid-term)**

**Dr. I. Tetlow (lectures 12-22 and final exam)**

### Readings

Week	Date	Topic	(Botany Mauseth 6 <sup>th</sup> edition)
1	Sept 6 <sup>th</sup>	Introduction to the course; Evolution of Plants	Chapters 17 (page 463+) and Chapter 19 (page 511+)
2	Sept 11 <sup>th</sup>	Evolution of Plants continued; Life Cycles (seedless plants)	Chapter 20 (page 539+)

3	Sept 13 <sup>th</sup>	Classification, Reproductive strategies	Chapters 20, 21 and 22 (page 539-587)
4	Sept 18 <sup>th</sup>	Angiosperm flowers, Flowering genes	Chapters 9 (page 221+) and 23 (page 609+) Chapter 14 (page 387)
5	Sept 20 <sup>st</sup>	Pollination, Embryogenesis - fruits	Chapter 23 (page 609+)
6	Sept 25 <sup>th</sup>	Seeds - Germination & early growth	Chapter 9
7	Sept 27 <sup>th</sup>	Meristems, cells differentiating into tissues	Chapters 4 and 5
8	Oct 2 <sup>nd</sup>	Cell types and tissues	Chapter 4 and 5
9	Oct 4 <sup>th</sup>	Organ types - roots and shoots	Chapters 5 and 7
	Oct 9 <sup>th</sup>	<b>FALL STUDY BREAK NO CLASSES</b>	
10	Oct 11 <sup>th</sup>	Secondary growth - how plants get bigger	Chapter 7
11	Oct 16 <sup>th</sup>	Leaves - structure and function	Chapter 6
	<b>Oct 18<sup>th</sup></b>	<b>Mid-term Examination in class</b>	
12	Oct 23 <sup>rd</sup>	Photosynthesis - evolution	Chapter 10
13	Oct 25 <sup>th</sup>	Photosynthesis - mechanism	Chapter 10
14	Oct 30 <sup>th</sup>	Photosynthesis - Carbon acquisition, C3, C4, CAM metabolism	Chapter 10

15	Nov 1 <sup>st</sup>	Respiration	Chapter 11
16	Nov 6 <sup>th</sup>	Inorganic nutrients in soils - N symbiosis	Chapter 13
17	Nov 8 <sup>th</sup>	The Fungi (including mycorrhizae)	
18	Nov 13 <sup>th</sup>	Water - potential and uptake	Chapter 12
19	Nov 15 <sup>th</sup>	Water loss	Chapter 12
20	Nov 20 <sup>th</sup>	Moving water and sugars around the plant	Chapter 12
21	Nov 22 <sup>nd</sup>	Moving water and sugars around the plant	Chapter 12
22	Nov 27 <sup>th</sup>	Review	

**Final examination Friday December 6<sup>th</sup> at 2:30PM (location TBA)**

**Note:** Reduced versions of the lecture slides will be available on Courselink – it is suggested that you print them out and bring them with you to the lecture so you can take additional notes.

## 5.5 Laboratories

Week	Date	Lab #	Lab Title
1	Sept 19-20	1	Evolution of plants, life cycles & flower morphology

2	Sept 26-27	2	Seeds structure & germination Seedling growth and morphology Seedling growth & morphology (continued)
3	Oct 3-4	3	Meristems Identifying different cell types
4	Oct 10-11	4	Photomorphogenesis Root and stem anatomy
5	Oct 17-18	5	Leaf anatomy Epidermis and stomatal complexes Photosynthesis in C3 and C4 plants
6	Oct 24-25	6	Hill reaction Starch detection in leaves
7	Oct 31, Nov 1	7	<b>Visualizing water transport</b> <b>Measuring osmosis</b> Observing cell turgor and plasmolysis
8	Nov 7-8	8	<b>Symbiotic plant-microbe interactions</b> Introduction to the group projects
9	Nov 14-15		<b>Group project work</b>



10	Nov 21-22	Group project work
11	Nov 28	No lab scheduled – due date for group project reports

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## 6 Assessments

Your grade for the course will be determined from the total results of one midterm examination, laboratory work including an independent project and a final examination.

### 6.1 Midterm Examination

The **MIDTERM EXAMINATION** will be held in class at **10:00 – 11:20 a.m. on Thursday October 18<sup>th</sup>**. It will contribute **30%** towards your final grade. Since the midterm examination occurs during a lecture period no alternative time will be scheduled. If you miss the midterm examination due to illness please notify us immediately or bring documentation as soon as possible.

### 6.2 Final Examination

The **FINAL EXAMINATION** will be on **Friday December 6<sup>th</sup>** (2:30-4:30 p.m., room to be announced). This examination will contribute **35%** towards your final grade. The final examination will cover primarily materials not covered in the midterm examination but will include related topics dealt with in the labs.

### 6.3 The Examinations

**The examinations will cover the lecture AND laboratory materials.** The examinations will consist of an array of multiple choice questions, some questions that require concise written answers, and analysis of visual materials. The answers to the midterm examination will be posted in the laboratory. The midterm examination will be returned to you. Any problems with examinations or questions arising from them must be resolved immediately.

### 6.4 Labs

**LABORATORY WORK** contributes **35%** towards your final grade. The grades come from:

**10 scheduled laboratories** that each require a lab report to be handed in either before you leave the lab, or the following week. Lab #1 is worth 2%, Labs #2-5 are worth 3%, Labs#6-7 are worth 4%, Lab #8 is worth 3%, and the group project report is worth 10%, for a **total of 35%** of your final grade.

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## 7 Course Statements

### 7.1 Illness & other authorized absences

If you are absent during laboratory periods, the midterm or final examination, for legitimate medical or other authorized reasons, please make sure you contact us. Provide supporting documentation as soon as you are able.

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# 8 Department of Molecular and Cellular Biology

## Statements

### 8.1 Academic Advisors

If you are concerned about any aspect of your academic program:

- Make an appointment with a program counsellor in your degree program. [B.Sc. Academic Advising](#) or [Program Counsellors](#)

### 8.2 Academic Support

If you are struggling to succeed academically:

- Learning Commons: There are numerous academic resources offered by the Learning Commons including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills. You can also set up individualized appointments with a learning specialist. <http://www.learningcommons.uoguelph.ca/>
- Science Commons: Located in the library, the Science Commons provides support for physics, mathematic/statistics, and chemistry. Details on their hours of operations can be found at: <http://www.lib.uoguelph.ca/get-assistance/studying/chemistry-physics-help> and <http://www.lib.uoguelph.ca/get-assistance/studying/math-stats-help>

### 8.3 Wellness

If you are struggling with personal or health issues:

- Counselling services offers individualized appointments to help students work through personal struggles that may be impacting their academic performance. <https://www.uoguelph.ca/counselling/>
- Student Health Services is located on campus and is available to provide medical attention. <https://www.uoguelph.ca/studenthealthservices/clinic>
- For support related to stress and anxiety, besides Health Services and Counselling Services, Kathy Somers runs training workshops and one-on-one sessions related to stress management and high performance situations. <http://www.uoguelph.ca/~ksomers/>

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## 9 University Statements

### 9.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

### 9.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or

compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The regulations and procedures for [Academic Consideration](#) are detailed in the Undergraduate Calendar.

### **9.3 Drop Date**

Courses that are one semester long must be dropped by the end of the fortieth class day; two-semester courses must be dropped by the last day of the add period in the second semester. The regulations and procedures for [Dropping Courses](#) are available in the Undergraduate Calendar.

### **9.4 Copies of Out-of-class Assignments**

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

### **9.5 Accessibility**

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required, however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance, and not later than the 40th Class Day.

More information: [www.uoguelph.ca/sas](http://www.uoguelph.ca/sas)

### **9.6 Academic Misconduct**

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The [Academic Misconduct Policy](#) is detailed in the Undergraduate Calendar.

### **9.7 Recording of Materials**

Presentations which are made in relation to course work—including lectures—cannot be

recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

## **9.8 Resources**

The [Academic Calendars](#) are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.

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