



BOT*2100 Life Strategies of Plants

Fall 2019

Section(s): C01

Department of Molecular and Cellular Biology

Credit Weight: 0.50

Version 3.00 - September 04, 2019

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-Requisites: 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, **ANNU 156 (Animal Science & Nutrition)**

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), **SSC 3304**

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: Thursday October 17th (in class)

Final Exam: Friday December 2nd 14:30-16:30 (Room, TBA)

Exam time and location is subject to change. Please see WebAdvisor for the latest information.

2 Instructional Support

2.1 Instructional Support Team

Instructor: 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).

Instructor: 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 or at extension 54794 and his office is in the Summerlee Science Complex, Room 4461 (laboratory 4406).

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.

2.2 Teaching Assistants

Teaching Assistant: Nathan Doner
Email: donern@uoguelph.ca

Teaching Assistant: Owen Hebb
Email: ohebb@uoguelph.ca

Teaching Assistant: Monika Jesionowska
Email: mjesiono@uoguelph.ca

Teaching Assistant: Nicholas Prudhomme
Email: nprudhom@uoguelph.ca

2.3 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).

3 Learning Resources

3.1 Required Resources

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 2019.

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 Resources**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.

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.
-

5 Teaching and Learning Activities

5.1 Course Content

Lectures

Lectures will be in **ANNU (Animal Science & Nutrition) Room 156**

Lectures are on:

Tuesdays at 10:00 - 11:20 AM

Thursdays at 10:00 - 11:20 AM

The first lecture is on **Thursday September 5th**. 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 18th** and **Thursday September 19th**.

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 5th: first lecture

September 18th and September 19th: first lab for section 1 and section 2 students respectively

October 17th: midterm examination

December 2nd: 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)

Week	Date	Topic	Readings (Botany Mauseth 6 th edition)
1	Sept 5 th	Introduction to the course; Evolution of Plants	Chapters 17 (page 463+) and Chapter 19 (page 511+)
2	Sept 10 th	Evolution of Plants continued; Life Cycles (seedless plants)	Chapter 20 (page 539+)
3	Sept 12 th	Classification, Reproductive strategies	Chapters 20, 21 and 22 (page 539-587)
4	Sept 17 th	Angiosperm flowers, Flowering genes	Chapters 9 (page 221+) and 23 (page 609+) Chapter 14 (page 387)
5	Sept 19 th	Pollination, Embryogenesis - fruits	Chapter 23 (page 609+)
6	Sept 24 th	Seeds - Germination & early growth	Chapter 9

Week	Date	Topic	Readings (Botany Mauseth 6th edition)
7	Sept 26 th	Meristems, cells differentiating into tissues	Chapters 4 and 5
8	Oct 1 st	Cell types and tissues	Chapter 4 and 5
9	Oct 3 rd	Organ types - roots and shoots	Chapters 5 and 7
10	Oct 8 th	Secondary growth - how plants get bigger	Chapter 7
11	Oct 10 th	Leaves - structure and function	Chapter 6
	Oct 17th	Mid-term Examination in class	
12	Oct 22 nd	Photosynthesis - evolution	Chapter 10
13	Oct 24 th	Photosynthesis - mechanism	Chapter 10
14	Oct 29 th	Photosynthesis - Carbon acquisition, C3, C4, CAM metabolism	Chapter 10
15	Oct 31 st	Respiration	Chapter 11

Week	Date	Topic	Readings
			(Botany Mauseth 6 th edition)
16	Nov 5 th	Inorganic nutrients in soils - N symbiosis	Chapter 13
17	Nov 7 th	The Fungi (including mycorrhizae)	
18	Nov 12 th	Water - potential and uptake	Chapter 12
19	Nov 14 th	Water loss	Chapter 12
20	Nov 19 th	Moving water and sugars around the plant	Chapter 12
21	Nov 21 st	Moving water and sugars around the plant	Chapter 12
22	Nov 26 th	Review	

Final examination Friday December 2nd 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.

Week	Date	Topic	Readings (Botany Mauseth 6 th edition)
-------------	-------------	--------------	---

5.5 Laboratories

Week	Date	Lab #	Lab Title
1	Sept 18-19	1	Evolution of plants, life cycles & flower morphology
2	Sept 25-26	2	Seed structure & germination Seedling growth and morphology
3	Oct 2-3	3	Seedling growth & morphology (continued) Meristems Identifying different cell types
4	Oct 9-10	4	Photomorphogenesis Root and stem anatomy
5	Oct 16-17	5	Leaf anatomy

Week	Date	Lab #	Lab Title
			Epidermis and stomatal complexes
6	Oct 23-24	6	Photosynthesis in C3 and C4 plants Hill reaction Starch detection in leaves
7	Oct 30-31	7	Visualizing water transport Measuring osmosis Observing cell turgor and plasmolysis
8	Nov 6-7	8	Symbiotic plant-microbe interactions Introduction to the final projects
9	Nov 13-14		Final project work
10	Nov 20-21		Final project work
11	Nov 27		No lab scheduled – due date for final project reports

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 17th**. 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 2nd** (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 final project report is worth 10%, for a **total of 35%** of your final grade.

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.

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.selfregulationskills.ca/>

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 grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Graduate Calendar - Grounds for Academic Consideration

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

9.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

Graduate Calendar - Registration Changes

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml>

Associate Diploma Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml>

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 can be found on the SAS website
<https://www.uoguelph.ca/sas>

9.6 Academic Integrity

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 encourages academic integrity. 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.

Undergraduate Calendar - Academic Misconduct
<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

Graduate Calendar - Academic Misconduct
<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

9.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, 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 that apply to undergraduate, graduate, and diploma programs.

Academic Calendars
<https://www.uoguelph.ca/academics/calendars>
