



# **BOT\*4380 Metabolism in the Whole Life of Plants**

Winter 2023

Section(s): C01

Department of Molecular and Cellular Biology

Credit Weight: 0.50

Version 1.00 - January 12, 2023

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## **1 Course Details**

### **1.1 Calendar Description**

This course follows the developmental changes that take place in plants, and explores the molecular, biochemical and physiological mechanisms that are responsible for development. Emphasis will be placed on the importance of modern experimental methods and critical evaluation of data.

**Pre-Requisites:** BIOL\*1090, BIOC\*2580

### **1.2 Course Description**

This course follows the developmental changes that take place in plants, and explores the molecular, biochemical, and physiological mechanisms that are responsible for development. Emphasis will be placed on the importance of modern experimental methods and critical evaluation of data. 0.5 U. Prerequisites: BIOL\*1090 & BIOC\*2580.

### **1.3 Timetable**

LECTURE, Face-to-Face (as posted on Webadvisor), M, W, F, 10:30 am-11:20 am, CRSC 116. See '**Course Delivery**' below for more details.

### **Course Delivery**

Both Dr. Akhtar and Dr. Micallef will be presenting lectures using F2F or AD-S via Microsoft Teams (AD-S if required by the U of G or if an instructor deems it necessary for the safety of students and instructors). Instructors will provide information on covid-19 restrictions to students through email and on Courselink. If there is a snow day, Micallef will provide a

voice-over version of the lecture for that day; it will not be covered in class the next period.

## 1.4 Final Exam

There is a final exam scheduled for April 13, 2023, 7-9pm, location TBD. The final exam directly examines material presented by Dr. Akhtar in the 2<sup>nd</sup> half of the course; thus, it is not cumulative for the whole course.

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## 2 Instructional Support

### 2.1 Instructional Support Team

**Instructor:** Dr. Tariq Akhtar  
**Email:** takhtar@uoguelph.ca  
**Telephone:** +1-519-824-4120 x54794  
**Office:** SC1 4461  
**Office Hours:** By appointment.

Feel free to contact by email.

**Instructor:** Dr. Barry Micallef  
**Email:** bmicalle@uoguelph.ca  
**Telephone:** +1-519-824-4120 x54384  
**Office:** CRSC 424  
**Office Hours:** There will be no F2F office hours.

Feel free to contact by email.

### 2.2 Note

B. Micallef will not have F2F office hours in Winter 2023, but students are free to set up Microsoft Teams meetings at a mutually agreed-upon time to consult with B. Micallef.

There are no GTAs in BOT 4380. All assignments, quizzes, and the final exam are marked by either Dr. Akhtar or Dr. Micallef.

## 3 Learning Resources

There is no text to purchase. There will be Lecture Presentations and other Required Reading posted on Courselink, and Supplemental Readings including references from the scientific literature will be also be posted on Courselink.

### 3.1 Additional Resources

#### **Plant Biochemistry (Textbook)**

- Bowsher, Steer & Tobin (2008) *Plant Biochemistry*. Garland Science, Taylor & Francis Group, LLC, New York, New York. QK 861.B69 2008.
- Available in the Library

#### **Path of Carbon in Plants (Textbook)**

- Bassham & Calvin (1957) *Path of Carbon in Plants*. Prentice-Hall Publishing. QK 882.B3.
- Available in the Library

#### **Biochemistry and Molecular Biology of Plants (Textbook)**

- Buchanan, Gruissem & Jones (2000) *Biochemistry and Molecular Biology of Plants*. American Society of Plant Physiologists. QK 861.B45.
- Available in the Library

#### **The Path of Carbon in Photosynthesis (Textbook)**

- Calvin (1962) The path of carbon in photosynthesis. *Science* 135: 879-889. QH 9 B6.B29.
- Available in the Library

#### **Plant Secondary Metabolites: Occurrence, Structure, and Role in the Human Diet (Textbook)**

- Crozier, Clifford, and Ashihara (2006) *Plant Secondary Metabolites: Occurrence, Structure, and Role in the Human Diet*. Blackwell Publishing. QK 881.P55 2006.
- Available in the Library

#### **Plant Physiology, Biochemistry, and Molecular Biology (Textbook)**

- Dennis (1997) *Plant Physiology, Biochemistry, and Molecular Biology*. Longman Publishing. QK 881.P54 1997.
- Available in the Library

### **Plant Biochemistry and Molecular Biology (Textbook)**

- Heldt (1997) Plant Biochemistry and Molecular Biology. Oxford University Press. QK 861 H4513 1997.
- Available in the Library

### **Plant Physiology (Textbook)**

- Taiz & Zeiger (2015) Plant Physiology. Sinauer Associates. QK 711.2 T35 2014.
- Available in the Library

## **3.2 Additional Useful Sources**

- There are several journals that provide original scientific articles dedicated to plant biology such as Plant Physiology, The Plant Cell, The Plant Journal, Plant Molecular Biology, Plant and Cell Physiology, Journal of Experimental Botany, Plant, Cell and Environment, etc.
- Wider-audience journals such as Science, Nature, Proceedings of the National Academy of Sciences, Cell, etc. also include many original scientific articles in plant biology and related studies.
- There are also several journals that publish review articles such as Annual Reviews of Plant Physiology and Plant Molecular Biology, Annual Plant Reviews, Trends in Plant Science, Current Opinion in Plant Science, Annual Reviews of Biochemistry, etc.

# **4 Learning Outcomes**

## **4.1 Course Learning Outcomes**

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

1. Grasp both the historical development and the current state of knowledge in plant biology, and particularly in plant metabolism, including an appreciation of emerging technologies and experimental methods.
2. Integrate the physiological, biochemical, and molecular mechanisms whereby autotrophic organisms, and particularly seed plants, sustain themselves in the context of the whole life cycle of the plant.
3. Interpret the scientific literature and data relevant to plant biology and to plant metabolism in particular.
4. Communicate effectively using scientific writing.

5. Apply forms of inquiry including hypothesis development through critical analysis of relevant scientific literature and essay writing.
  6. Apply knowledge of plant metabolism to specific questions associated with relevant biological processes, agriculture, forestry, energy production, and medicine.
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## 5 Teaching and Learning Activities

This course will consist of interactive lectures with opportunity for questions and discussion, including some discussion of scientific papers. In addition, required and supplemental readings will be posted on Courselink throughout the course. Required and supplemental readings, and scientific paper citations directed to each topic below, will be indicated in the Powerpoint lectures posted on Courselink.

Comprehensive treatments are given for of all the topics listed below; the list below is a general outline divided between the two lecturers in the course. It does not necessarily provide all specific topics covered.

### 5.1 Lectures

#### **(A) Lectures by Micallef (1<sup>st</sup> half of the course)**

#### **Module 1-The Light Reactions in Photoautotrophic Organisms**

Introduction to autotrophy and autotrophic organisms; chemoautotrophy versus photoautotrophy; photoautotrophy in terrestrial (land) plants at different levels of organization: .

Properties of light and light-absorbing pigments: basic properties of the light reactions; four crucial characteristics of chlorophyll; absorption spectrometry; specific chromophores in photoautotrophic organisms; chlorophyll species and their structure-function relationships; a pigment = a chromophore-protein complex; metabolites derived from 5-aminolevulinate; methods used to study biochemical pathways; chlorophyll synthesis and degradation in plants, including regulatory mechanisms; phycobilin pigments and their significance.

Photosystems and fates of absorbed light energy: characteristics of the light-harvesting apparatus; definition of a photosystem; X-ray crystallography of membrane-bound proteins; structure and function of light-harvesting complexes, including the phycobilisome antenna network in cyanobacteria; fates for excitation energy; funnelling of excitation energy to the

reaction center; efficiency of a plant photosystem in utilising sunlight energy.

Electron transport and ATP synthesis: photochemistry and quantum yield; reaction center complex in purple-sulfur bacteria; function of mobile electron carriers; structure-function relationships for the major thylakoid complexes; requirement for one or two photosystems; electron transport and generation of a proton gradient; coupling of the proton gradient to ATP synthesis.

Regulation of the light reactions: cyclic & non-cyclic electron transport; phosphorylation of LHC's; functional significance of the spatial arrangement of thylakoid complexes; processes to dissipate excess light energy; dealing with reactive oxygen species (ROS); coping with varying irradiance and light quality.

Improving the light reactions, impact of stress.

## **Module 2-Primary Carbon Metabolism in Source and Sink Plant Tissues**

Introduction to photosynthetic C metabolism and the Calvin-Benson cycle: why organisms on earth are C-based; elemental composition of terrestrial plants; defining photosynthetic C, N & S metabolism; elucidating the 1<sup>st</sup> product of C fixation in C3 plants; elucidating the reactions of the Calvin-Benson cycle; phases and reactions of the Calvin-Benson cycle; interactions with respiratory metabolism; end products of photosynthesis.

Regulation of the Calvin-Benson cycle: modulation of enzyme activity by the ionic & solute environment in the stroma; thioredoxin-ferredoxin system; properties of ribulose biphosphate carboxylase/oxygenase (Rubisco); Rubisco activase.

Photorespiration and altered photosynthetic types: definition of photorespiration; Rubisco oxygenase reaction; evolutionary kinetics of Rubisco; C2 oxidative photosynthetic cycle and photorespiratory N cycle; elucidation of the photorespiratory cycle; effects of photorespiration on net C assimilation and the quantum requirement for C fixation; atmospheric CO<sub>2</sub>, temperature and photorespiration; C4 photosynthesis; chloroplast ultrastructure in C4 plants; CAM metabolism; carboxysomes in bacteria.

End product synthesis and transport: properties of sucrose and starch; pathways of sucrose and starch synthesis, including regulation; chloroplast phosphate translocator and phosphate cycling; chloroplastic starch degradation; phloem loading and unloading.

Sucrose utilization in sink tissues: sucrose hydrolytic enzymes and relationship to respiratory metabolism.

Improving photosynthetic C metabolism, impact of stress.

### **Module 3-N & S Uptake, Assimilation and Utilization in Plants**

Overview of N metabolism and N uptake: major inorganic forms of N & S; nitrogen cycle, including biochemical aspects of N<sub>2</sub> fixation; roles of N and S in the plant; phases and enzymes of N uptake and assimilation; N uptake and transport, including cellular transport processes, N remobilization during senescence.

Assimilation of nitrate and ammonium to organic N: nitrate and nitrite reductase, including regulation; assimilation of ammonium by GS-GOGAT; sources of ammonium in plant cells; nitrate assimilation in roots and shoots; organic N transport compounds; interactions between C and N metabolism;

S uptake and assimilation: sulfate uptake and transport; activation and reduction of sulfate; formation of cysteine and glutathione; functions for glutathione in the plant; amino acid synthesis; N & S utilization in plants.

Improving N uptake and assimilation, N-use efficiency in plants.

### **Module 4-Germination in Plants**

Germination and early seedling establishment in plants: the 'switch' from seed development to seed germination; the mobilization of seed reserves, including protein, starch and fatty acid degradation; early seedling establishment, including photomorphogenesis mediated by

photoreceptors.

## **(B) Lectures by Akhtar (2<sup>nd</sup> half of the course)**

### **Module 6-Introduction to Secondary Metabolism**

Understanding the interface between primary and secondary metabolism: Classification of the three main clades of 'specialized metabolites'; focus will be on alkaloid, glucosinolate, and polyamine biosynthesis and their physiological importance. Medicinal plants will be discussed.

### **Module 7-Isoprenoid Metabolism**

Isoprenoids: the largest class of secondary metabolites. Focus will be on isoprenoid synthesis from primary precursors to the physiological and ecological roles that these compounds serve. Focus will be on terpenes, sterols, carotenoids, polyprenols and isoprenoid-derived vitamins and plant hormones. Industrial applications of isoprenoids will be discussed.

### **Module 8-Lipid Metabolism**

Fatty acid biosynthesis and nomenclature: Assembly of phospholipids, galactolipids, triacylglycerols, and cutin/epicuticular waxes. Biophysical properties of plant lipids and the regulation of their synthesis will be explored.

### **Module 9-Phenolics**

Biosynthesis and function of plant phenolics: Flavonoids, aromatic amino acid metabolism, plant volatiles, and cell wall assembly.

### **Module 10-Vitamins, Cofactors, and Polyketides**

Co-factor biosynthesis: Emphasis will be on B-vitamins and their functional roles. Branched chain amino acid metabolism, prenylated polyketides and their industrial significance.

## **5.2 Important Dates**



## Important Dates

There will be an in-person Midterm Exam scheduled outside of class the evening of Tuesday, Feb. 7 from 7:00-8:30 pm (Room TBA), and one in-class Quiz directed to Micallef's material starting at 10:30 am for 45 min on Friday, Feb. 17. Micallef will have a review session for ~1 hour through Microsoft Teams starting at 7:30 pm on Monday, Feb. 6 (for the Midterm Exam).

The topic for the 1<sup>st</sup> 3-page essay must be selected and approved by B. Micallef by Mon., Jan. 16 at 11:59 pm. The 1st Essay Pre-submission must be submitted to B. Micallef for marking on Mon., Jan. 30 by 11:59 pm as electronic copies (Word & pdf versions) using Dropbox in Courselink. The Pre-submission will be marked and returned by Mon., Feb. 6. The completed 1st Essay is due by Mon., Feb. 27 at 10:30 am as an electronic copy using Dropbox (Word and pdf versions). The topic for the 2nd Essay will be provided on Mon., Feb. 27. The 2nd Essay is due by Fri., April 8th at 11:59 pm.

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## 6 Assessments

### 6.1 Assessment Details

#### Course Assessment (0%)

Learning Outcome: 1, 2, 3, 4, 5, 6

#### Course Assessment

<b>Form of Assessment</b>	<b>Weight of Assessment</b>	<b>Quiz/Exam Dates Due Dates for Assignments</b>	<b>Additional Comments</b>	<b>Learning Outcomes Addressed</b>
Midterm Exam	25% of final grade	Tuesday, Feb. 7, outside class (Room TBA), 7:00-8:30 pm.	Includes all material to Feb 3 lecture, inclusive.	1-3, 5-6
Quiz	10% of final grade	Scheduled in lecture for 45 min on Feb. 17 starting at 10:30 am.	Includes all material covered starting after the Midterm Exam.	1-3, 5-6
Pre-submission for the 1 <sup>st</sup> 3-page essay: complete Intro. paragraph; remaining Intro. sentences; 10 references (5 must be <u>original</u> scientific articles).	2.25% of final grade	<p>Topic selected &amp; approved by B. Micallef via email by Mon, Jan 16 at 11:59 pm.</p> <p>Pre-submission due on Mon, Jan 30 at 11:59 pm using Dropbox (Word &amp; pdf versions).</p>	Pre-submission will be marked & returned by Mon., Feb. 6.	1-6
Completed  1 <sup>st</sup> 3-page essay	12.75% of final grade	Due by Mon, Feb 27 <sup>th</sup> at 10:30 am as an electronic copy using DropBox in Courselink.	Essay marks & evaluations returned by Mon, March 13..	1-6

<b>Form of Assessment</b>	<b>Weight of Assessment</b>	<b>Quiz/Exam Dates Due Dates for Assignments</b>	<b>Additional Comments</b>	<b>Learning Outcomes Addressed</b>
Midterm Exam	25% of final grade	Tuesday, Feb. 7, outside class (Room TBA), 7:00-8:30 pm.	Includes all material to Feb 3 lecture, inclusive.	1-3, 5-6
Quiz	10% of final grade	Scheduled in lecture for 45 min on Feb. 17 starting at 10:30 am.	Includes all material covered starting after the Midterm Exam.	1-3, 5-6
Pre-submission for the 1 <sup>st</sup> 3-page essay: complete Intro. paragraph; remaining Intro. sentences; 10 references (5 must be <u>original</u> scientific articles).	2.25% of final grade	<p>Topic selected &amp; approved by B. Micallef via email by Mon, Jan 16 at 11:59 pm.</p> <p>Pre-submission due on Mon, Jan 30 at 11:59 pm using Dropbox (Word &amp; pdf versions).</p>	Pre-submission will be marked & returned by Mon., Feb. 6.	1-6
2 <sup>nd</sup> 3-page essay	15% of final grade		Topic provided on Mon, Feb 27. Essay marks returned by	1-6

<b>Form of Assessment</b>	<b>Weight of Assessment</b>	<b>Quiz/Exam Dates Due Dates for Assignments</b>	<b>Additional Comments</b>	<b>Learning Outcomes Addressed</b>
Midterm Exam	25% of final grade	Tuesday, Feb. 7, outside class (Room TBA), 7:00-8:30 pm.	Includes all material to Feb 3 lecture, inclusive.	1-3, 5-6
Quiz	10% of final grade	Scheduled in lecture for 45 min on Feb. 17 starting at 10:30 am.	Includes all material covered starting after the Midterm Exam.	1-3, 5-6
Pre-submission for the 1 <sup>st</sup> 3-page essay: complete Intro. paragraph; remaining Intro. sentences; 10 references (5 must be <u>original</u> scientific articles).	2.25% of final grade	<p>Topic selected &amp; approved by B. Micallef via email by Mon, Jan 16 at 11:59 pm.</p> <p>Pre-submission due on Mon, Jan 30 at 11:59 pm using Dropbox (Word &amp; pdf versions).</p>	Pre-submission will be marked & returned by Mon., Feb. 6.	1-6
			the final exam period.	
Final Exam (Akhtar lectures)	35% of final grade		Includes lecture material	1-3, 5-6

<b>Form of Assessment</b>	<b>Weight of Assessment</b>	<b>Quiz/Exam Dates Due Dates for Assignments</b>	<b>Additional Comments</b>	<b>Learning Outcomes Addressed</b>
Midterm Exam	25% of final grade	Tuesday, Feb. 7, outside class (Room TBA), 7:00-8:30 pm.	Includes all material to Feb 3 lecture, inclusive.	1-3, 5-6
Quiz	10% of final grade	Scheduled in lecture for 45 min on Feb. 17 starting at 10:30 am.	Includes all material covered starting after the Midterm Exam.	1-3, 5-6
Pre-submission for the 1 <sup>st</sup> 3-page essay: complete Intro. paragraph; remaining Intro. sentences; 10 references (5 must be <u>original</u> scientific articles).	2.25% of final grade	<p>Topic selected &amp; approved by B. Micallef via email by Mon, Jan 16 at 11:59 pm.</p> <p>Pre-submission due on Mon, Jan 30 at 11:59 pm using Dropbox (Word &amp; pdf versions).</p>	Pre-submission will be marked & returned by Mon., Feb. 6.	1-6
			covered by T. Akhtar.	

**Midterm Exam (25%)****Date:** Tuesday, Feb. 7, TBA**Learning Outcome:** 1, 2, 3, 5, 6**Additional Information on the Midterm Exam**

There will be an in-person Midterm Exam scheduled outside of class the evening of Tuesday, Feb. 7 from 7:00-8:30 pm (Room TBA). Micallef will have a review session for ~1 hour through Microsoft Teams starting at 7:30 pm on Monday, Feb. 6 for the Midterm Exam.

The Midterm Exam will consist primarily of short-answer questions, but some multiple-choice & true-or-false questions will be included. The Midterm Exam will test: (1) all information provided in the Powerpoint presentations posted on Courselink; (2) additional information discussed in lecture; and (3) any Required Readings posted on Courselink.

**Completed First 3-Page Essay (15%)****Learning Outcome:** 1, 2, 3, 4, 5, 6

Complete instructions on writing the 3-page essays, including the evaluation scheme, are provided in a separate document posted in the News Item section of Courselink. The 1<sup>st</sup> Essay and 2<sup>nd</sup> Essay will be marked by B. Micallef and T. Akhtar, respectively. The topic for the 1<sup>st</sup> 3-page essay is open, and it must be selected and approved by B. Micallef by Mon, Jan 16 at 11:59 pm. A list of potential general topics (for guidance only, other topics can be chosen if approved by the instructor) for the 1<sup>st</sup> 3-page essay are provided in the instructions posted on Courselink, and approval will occur by the instructor through email. To provide writing assistance for the 1<sup>st</sup> 3-page essay, a Pre-submission, including the complete introductory paragraph, the introductory sentence for each remaining paragraph, and a minimum of 10 references (5 must be original scientific articles), will be submitted to B. Micallef for marking on Mon. Jan. 30 by 11:59 pm as an electronic copy. The grade provided for this Pre-submission will include: (1) the entire grade for the Introductory paragraph (i.e. 10% of the total essay value out of 100%); and (2) a portion of the total grade for Research worth 5% of the total essay value out of 100%. Thus, the Pre-submission is worth 2.25% of the final grade in the course. When handing in each essay and the Pre-submission for the 1<sup>st</sup> 3-page essay, both a Word and pdf file must be submitted to the appropriate instructor by the deadline. The electronic copy is used to assess when the assignment was submitted, and a confirmatory email will be sent by the instructor.

**Completed Second 3-Page Essay (15%)****Date:** Due by Friday, April 10th at 4 pm**Learning Outcome:** 1, 2, 3, 4, 5, 6

- Must be submitted as an electronic copy to T. Akhtar
- Marked essays will be returned during the final exam period

### Final Examination (35%)

**Date:** Thursday, April 13 2023, 7:00-9:00pm, TBD

**Learning Outcome:** 1, 2, 3, 5, 6

Includes material from T. Akhtar's lectures starting on Monday, Feb. 27, 2023

B. Micallef's lecture material will not be directly tested on the Final Exam, although many principles discussed by B. Micallef are applicable to the 2nd half of the term

### Quiz (10%)

**Date:** Friday, Feb. 17, In-class

**Learning Outcome:** 1, 2, 3, 5, 6

#### Additional Information on the Quiz

There will be one in-class Quiz directed to Micallef's material starting at 10:30 am for 45 min on Friday, Feb. 17. The Quiz will consist of multiple-choice, true-or-false, fill-in-the-blank, and short-answer questions. **Important:** The Quiz will test: (1) all information provided in the Powerpoint presentations posted on Courselink; (2) additional information discussed in lecture; and (3) any Required Readings posted on Courselink.

## 7 Course Statements

### 7.1 Copies of Out-of-Class Assignments, Lecture Notes

Keep paper and/or other reliable back-up copies of all out-of-class assignments: a student may be asked to resubmit work at any time. It is advisable to keep a hard copy of all lecture notes; electronic copies of the lecture notes will not be provided to students apart from Courselink. Thus, files cannot be obtained once access to the Courselink site has expired. Materials applicable to the first half of the course will be removed from Courselink at 11:59 pm on Fri, Feb 17, so it is essential to download ALL materials posted on Courselink prior to this time. This is done for the following reasons: **(1)** to encourage students to download & read the lecture presentations in a timely manner; **(2)** to encourage students to keep the information for future activities; **(3)** lecture notes are the property of the instructor (automatically copyrighted) and not the University; and **(4)** as observed in Fall 2022, the U of G website is not necessarily secure. Copies of course materials will not be provided separately to students using email or other means under any circumstances.

### 7.2 Grading and Submitting Assignments

Information on important dates for the Midterm Exam, Quiz, and Essays are provided in **6 Course Assessment and Important Dates** above. For the essays, a deduction will be assessed worth 10% of the assignment value per working day late = a deduction of 1.5% of your final grade per working day late, where a working day does not include Saturday and Sunday for both students and the instructors unless an accommodation has been approved by the instructor. Students must ask for an accommodation prior to the Midterm Exam, Quiz, and due date for the essays or marks may be deducted for not conforming to instructions. For the Midterm Exam, Quiz, and essays, if a reconsideration of grade is requested the entire marked test or essay will be provided to the instructor, and the entire essay or assignment will be re-marked.

Also ensure that any files submitted for marking are working properly (i.e., they open properly and can be read properly) prior to submitting them or marks may be deducted for not conforming to instructions.

### 7.3 Assessing Course Materials on Courselink

All materials for Micallef's portion of the course are provided in a course webpage embedded in Courselink that contains the lecture schedule and course materials. The link for this embedded webpage is provided in the News item section of Courselink under the Announcement 'Welcome to BOT\*4380 Winter 2023'. Students must download each file in this embedded webpage individually and not as a zip file. This approach is being used to encourage students to download all course materials gradually and not just prior to the quizzes. It is recommended to download and read over each Powerpoint presentation prior to lecture.

## 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/>

### 8.4 Personal information

Personal information is collected under the authority of the University of Guelph Act (1964), and in accordance with Ontario's Freedom of Information and Protection of Privacy Act (FIPPA) <http://www.e-laws.gov.on.ca/index.html>. This information is used by University officials in order to carry out their authorized academic and administrative responsibilities and also to establish a relationship for alumni and development purposes.

For more information regarding the Collection, Use and Disclosure of Personal Information policies please see the Undergraduate Calendar. (<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/intro/index.shtml>)

### 8.5 Course Offering Information Disclaimer

Please note that course delivery format (face-to-face vs online) is subject to change up to the first-class day depending on requirements placed on the University and its employees by public health bodies, and local, provincial and federal governments. Any changes to course format prior to the first class will be posted on WebAdvisor/Student Planning as they become available.

## 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>

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions

<https://www.uoguelph.ca/registrar/calendars/diploma/current/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 make a booking at least 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

For Guelph students, information can be found on the SAS website  
<https://www.uoguelph.ca/sas>

For Ridgetown students, information can be found on the Ridgetown SAS website  
<https://www.ridgetownc.com/services/accessibilityservices.cfm>

## 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>

## 9.9 Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website (<https://news.uoguelph.ca/2019-novel-coronavirus-information/>) and circulated by email.

## 9.10 Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g.. final exam or major assignment).

## 9.11 Covid-19 Safety Protocols

For information on current safety protocols, follow these links:

- <https://news.uoguelph.ca/return-to-campusess/how-u-of-g-is-preparing-for-your-safe-return/>
- <https://news.uoguelph.ca/return-to-campusess/spaces/#ClassroomSpaces>

Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives.

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