Western Science

Department of Biology

Biology 3603A Course Outline

1. Course information

Biology 3603A – *Ecophysiology of Plants*. Fall, 2024

Prerequisites: Biology 2601A/B.
Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

2. Teaching team

Instructor: **Denis Maxwell**
dmaxwell@uwo.ca
Office: 223 NCB

Teaching Assistant: **Alex Niski**
aniski@uwo.ca

Lab Coordinator: **Anica Bjelica**
abjelic@uwo.ca

3. Course Syllabus, Schedule, Delivery Mode

This course will introduce you to the physiological responses of plants to their environment along the continuum from stress through acclimation to adaptation. We will discuss how plants cope with a range of stress factors including: high light, low temperature, changes in [CO_2] and nutrient deficiency. As well, you will begin to understand how plants actually sense changes in their environment that alter gene expression and physiology leading to phenotypic and genotypic changes. The course has a strong laboratory component that will help develop a range of transferable skills including collaboration, problem-solving and communication.

Learning Outcomes

Here are the major learning outcomes from the lecture component of the course.

1. the concepts of stress, acclimation, adaptation, homeostasis, photostasis as well as the core principles of thermodynamics
2. the structure and function of the photosynthetic apparatus: physics of light absorption, photosystems, linear electron transport, Calvin Cycle, photorespiration
3. environmental impacts (changes in temperature, light, nutrients) on different components of photosynthesis
4. experimental data (tables, graphs, protein, RNA, DNA blots).
5. the utility of model genetic systems (e.g. Chlamydomonas, Arabidopsis) and the technique of mutagenesis for elucidating the molecular basis of acclimation & adaptation
6. the evolutionary processes that result in adaptation and factors that constrain adaptation (e.g. rubisco active site).
7. the mechanisms photoautotrophs use to adapt to low temperature (enzyme properties, fatty acid biosynthesis)
8. the global nitrogen cycle, redox states of N, nitrogen metabolism, biological nitrogen fixation
9. plant water relations, including concepts of diffusion, osmosis, water potential-adaptation (halophytes)
10. climate change, particularly elevations in CO_2, on plant growth and physiology - CO_2 limitations.....FACE experiments, evapotranspiration
11. plant phenology and the interplay between photoperiod and temperature. The impact of climate change on phenological timing (e.g. effects of temperature)
12. photoperiod: from development (flowering time) to molecular aspects (e.g. phytochrome structure/function) to the importance of biological clocks
13. interpretation of graphical data.

These outcomes will be evaluated using the formats of short answer (i.e., 3 sentences) and long answer (i.e. 3 paragraphs). This may be done by providing definitions, compare and contrast, analysis of presented data, addressing novel and/or hypothetical situations.

The laboratory component of the course will develop: your teamwork skills. your ability to analyze and interpret data and provide reasonable biologically based explanations for your findings, your writing and presentation skills.

4. Course Materials

There is nothing to buy for the course. We will be using OWL Brightspace extensively. This is where you will find: class notes, textbook PDFs, testable class outcomes, announcements, grades and all information related to the laboratory component of the course.

5. Methods of Evaluation

Component	Worth (%)	Details
Pre-midterm quiz	2	In class, tbd
Group article review	5	In class, Nov. 11th
Term paper	12	Due Oct. 30th (accepted without penalty until Nov 2nd.)
Midterm Test	25	October 23rd (in class using laptop)
Laboratory	26	See details below
Final Exam	30	Final exam period

Term paper
Every student will write a 1500-word essay. We will discuss the scope of this essay in class.

Laboratory
The laboratory is a substantial component of the course. It will require you to work in groups of 3 students. All information pertinent to labs will be posted to OWL. Labs

start the week of September 25th.

Date (week of)	Details	Points
Sept 23	Lab overview, designing your experiment.	1
Sept 30	No labs this week	
Oct 7	Experiment session 1	1
Oct 14	No labs (Fall break)	
Oct 21	Experiment session 2	1
Oct 28	Experiment session 3	1
Nov 4	Analyze and plot data	
Nov 11	Review data (prepare for presentation)	
Nov 27	Group lab presentations	7
Dec 8	Peer evaluation due	3
Dec 8	Final group lab report	12
	Total marks	**26**

6. Academic Considerations, Accommodations and Accessibility

Academic Considerations
Students should familiarize themselves with the Policy on Academic Considerations

Students missing course work for medical, compassionate, or extenuating circumstances can request academic consideration by completing a request at the central academic consideration portal (website above). Note that supporting documentation is always required for academic consideration requests for final examinations.

This policy does not apply to requests for Academic Consideration submitted for attempted or completed work, whether online or in person. The policy also does not apply to students experiencing longer-term impacts on their academic responsibilities. These students should consult Accessible Education.
For procedures on how to submit Academic Consideration requests, see the the Office of the Registrar's webpage: AcademicConsiderations . All requests for Academic Consideration must be made within 48 hours after the assessment date or

submission deadline.

Essential Learning Requirements
Even when Academic Considerations are granted for missed coursework, the following are deemed essential to earn a passing grade: midterm test, lab report, lab presentation, final exam.

Religious Accommodation
When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at https://multiculturalcalendar.com/ecal/index.php?s=c-univwo.

Accommodation Policies
Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic Accommodation_disabilities.pdf.

7. Academic Policies

The website for Registrarial Services is http://www.registrar.uwo.ca.

In accordance with policy,

https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf,

the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at their official university address is attended to in a timely manner.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Your term papers and lab reports may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (http://www.turnitin.com).

8. Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on adding/dropping courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: https://www.uwo.ca/sci/counselling/.

Students who are in emotional/mental distress should refer to Mental Health@Western (https://uwo.ca/health/) for a complete list of options about how to obtain help.

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Please contact me if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Accessible Education at

http://academicsupport.uwo.ca/accessible_education/index.html

if you have any questions regarding accommodations.