Bio3224G – Selected Topics
'Molecular Sensing and Signalling in Plants'
Course Outline

1. Course Information

Course Information
Biology 3222G Molecular Sensing and Signalling in Plants – Winter Term 2025
Tues & Thurs 11:30-12:30 (lectures)
Drop-in tutorials Mon & Thurs 12:30-14:30 (dates TBD)

List of Prerequisites
A minimum mark of 60% in Biology 1001A or Biology 1201A and Biology 1002B or Biology 1202B or Integrated Science 1001X, and at least one half course in Biology at the 2200 level or above, or permission of the Department.

Unless you have either the requisites for this course or written special permission from your Dean's Designate (Department/Program Counsellors and Science Academic Advisors) 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. Instructor Information

Instructors	Email	Office	Phone	Office Hours
Dr. Thomas DeFalco	tdefalc@uwo.ca	NCB404	X81475	By appointment
TA: Anka Colo				

Students must use their Western (@uwo.ca) email addresses and include "BIO3224G" in the subject line when contacting their instructors. Office hours will be held on Zoom or in-person. Please email the instructor to arrange an appointment.

3. Course Syllabus, Schedule, Delivery Mode

Course description and list of topics
Plants are sessile organisms - rooted in place. However, they must respond to diverse stimuli while coordinating growth and development. How do plants sense their environment? How are responses to environmental perturbations or stresses coordinated at the cellular level? What are the similarities and differences in cell signalling between plants and animals? This course

will address these and other questions from the molecular perspective. The course will blend both lectures and discussion of cutting-edge research to cover such topics, including those listed below. Check the OWL site for specific dates and reading lists as the course progresses.

1. Intro/plant molecular biology
    a. Plant sensing and receptors
    b. Model plants and their study
2. Principles of signal transduction
    a. Post-secondary modifications
    b. Electrical signalling
    c. Calcium signalling
    d. Lipid signalling
    e. Phase separation
3. Plant hormones: perception and signalling
    a. 'Classical' hormones
    b. 'Newcomer' hormones
4. Peptides and their receptors
    a. Biosynthesis and perception of peptides
    b. Receptor kinase signalling
5. Mechanical signalling
    a. Cell wall integrity sensing
    b. Sensory cells and plant movement
6. Plant-microbe interactions and the plant immune system
    a. Intro to plant pathology/immunology
    b. Symbioses and the microbiome
7. Plant biotechnology
    a. Techniques
    b. Engineering traits

Learning objectives

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

- Understand and describe the mechanisms of plant signal transduction
- Interpret, summarize, and present current state-of-the-art research in the field of plant-environment interactions
- Classify plant hormones and describe their perception, signalling pathways, and functions
- Understand the different forms of stimuli perceived at the cellular level and the receptor systems involved
- Describe how plants interact other organisms and beneficial microbes
- Describe the mechanisms of pathogen perception and the plant immune system
- Identify the key differences in cell signalling between plant and animal systems

Lectures will be held in-person, however, asynchronous online lectures may be used if needed and will be available via the OWL site. Drop-in tutorials are meant to provide assistance/feedback for the writing component of the course.

Key sessional dates

Classes begin: January 7
Spring Reading Week: February 17 – 21

Classes end: April 4
Exam period: April 7 – 30, 2025

4. Course Materials

Texts/materials
No textbook is assigned for this course as we will focus on state-of-the-art research. Specific, primary research or review articles will be assigned throughout the term and will be distributed via the course OWL site. Background material will be covered in lectures.

Aspects of the course are covered in many general plant biology texts, such as *Biochemistry and Molecular Biology of Plants* 2nd edition by Buchanan, Gruissem, and Jones (2015, Wiley), which is available online via the UWO library, and *Plant Physiology and Development* 7th edition by Taiz, Zeiger, Moller, and Murphy (2022, Sinauer), which is the same text used in Biology 2601A/B. These are suggested as useful resources only and are not required for the course.

All course material will be posted to OWL: https://westernu.brightspace.com/

Students are responsible for checking the course OWL site regularly for news and updates. This is the primary method by which information will be disseminated to all students in the class.

If students need assistance with the course OWL site, they can seek support on the OWL Brightspace Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

Technical Requirements
Stable internet connection, computer with working microphone and/or webcam.

5. Methods of Evaluation

Grading Scheme and Assessment Dates

The overall course grade will be calculated as listed below:

Commentary paper	10%	Due Feb 14 (submitted via OWL)
Presentation	20%	March 17 to April 6 (in-class)
Participation	10%	Based on in-class participation (lectures)
Major paper	30%	Due Apr 7 (submitted via OWL)
Final Exam	30%	TBD

Students will write a short (<500 word) research highlight/commentary as well as a major paper. Topics for these written assignments and for student presentations will be discussed early in the course.

General information about missed coursework
Students must familiarize themselves with the *University Policy on Academic Consideration – Undergraduate Students in First Entry Programs* posted on the Academic Calendar: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf,

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, please see the information posted on the Office of the Registrar's webpage:
https://registrar.uwo.ca/academics/academic_considerations/
All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline.

All Academic Consideration requests must include supporting documentation; however, recognizing that formal documentation may not be available in some extenuating circumstances, the policy allows students to make one Academic Consideration request **without supporting documentation** in this course. However, the following assessments are excluded from this, and therefore always require formal supporting documentation:

- Examinations scheduled during official examination periods (Defined by policy)
- Group presentation project

When a student *mistakenly* submits their one allowed Academic Consideration request **without supporting documentation** for the assessments listed above or those in the **Coursework with Assessment Flexibility** section below, the request cannot be recalled and reapplied. This privilege is forfeited.

Evaluation Scheme for Missed Assessments
When a student misses the Final Exam and their Academic Consideration has been granted, they will be allowed to write the Special Examination (the name given by the University to a makeup Final Exam). See the Academic Calendar for details (under Special Examinations), especially for those who miss multiple final exams within one examination period.

Missed group presentations where one a student's Academic Consideration has been granted, the group will be able to perform a makeup presentation, for which one lecture date will be set aside.

Essential Learning Requirements
Even when Academic Considerations are granted for missed coursework, the following are deemed essential to earn a passing grade.

- A passing grade in the course is conditional on a passing mark on the major paper. Failure to submit a major paper with a passing grade will result in a failing grade (i.e., 45) for the course.

Coursework with Assessment Flexibility
By policy, instructors may deny Academic Consideration requests for the following assessments with built-in flexibility:

Deadline with a No-Late-Penalty Period
Assignments. Students are expected to submit each of the two written assignments (Commentary and Major Paper) by the deadlines listed. Should extenuating circumstances arise, students do not need to request Academic Consideration and they are permitted to submit their assignment up to 96 hours past the deadline without a late penalty. Should students submit their assessment beyond 96 hours past the deadline, a late penalty of 20% per day will be applied.

6. Additional Statements

Religious Accommodation
When conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request an accommodation for their absence in writing to the course instructor and/or the Academic Advising office of their Faculty of Registration. This notice should be made as early as possible but not later than two weeks prior to the writing or the examination (or one week prior to the writing of the test).

Please visit the Diversity Calendars posted on our university's EDID website for the recognized religious holidays:

https://www.edi.uwo.ca.

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.

Academic Policies
The website for Registrar Services is https://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.

No electronic devices will be permitted on tests and exams.

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:

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

All required papers 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).

Support Services

Please visit the Science & Basic Medical Sciences Academic Advising 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 the course instructor 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.

Learning-skills counsellors at Learning Development and Success (https://learning.uwo.ca) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: https://www.uwo.ca/se/digital/.

Additional student-run support services are offered by the USC, https://westernusc.ca/services/.