

**General Course, Instructor & TA Information****Teaching Assistants:****Land Acknowledgement**

We/I acknowledge that Western University is located on the traditional lands of the Anishinaabek, Haudenosaunee, Lūnaapéewak and Chonnonton Nations, on lands connected with the London Township and Sombra Treaties of 1796 and the Dish with One Spoon Covenant Wampum. With this, we/I respect the longstanding relationships that Indigenous Nations have to this land, as they are the original caretakers. We acknowledge historical and ongoing injustices that Indigenous Peoples (First Nations, Métis and Inuit) endure in Canada, and we accept responsibility as a public institution to contribute toward revealing and correcting miseducation as well as renewing respectful relationships with Indigenous communities through our teaching, research and community service.

Learn more about Indigenous Initiatives at Western: <https://indigenous.uwo.ca/>

**Equity, Diversity, and Inclusivity Statement**

We will uphold an equitable and inclusive learning environment for all students in this course and we welcome students from all backgrounds, ethnicities, sexual orientations, and genders. This course is a safe learning environment where any form of discrimination will not be tolerated under any circumstances.

**Note: This class is LIVE! But there is a contingency plan for an in-person class pivoting to 100% online learning.**

In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, affected course content will be delivered entirely online synchronously (i.e., at the times indicated in the timetable). The grading scheme will not change. Any remaining assessments will also be conducted online as determined by the course instructor.

**Note:** Remote Proctoring Software may be used in this course, in the event of health lock-down. Tests and examinations in this course will be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide **personal information** (including some biometric data) and the session will be **recorded**. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at: <https://remoteproctoring.uwo.ca>

The website for the **Office of the Registrar** is <http://www.registrar.uwo.ca>.

In accordance with policy, 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 his/her official university address is attended to in a timely manner.

### **Prerequisite Requirements**

Biochemistry 2280A; Biology 2382A/B

“Unless you have either the requisites for this course or written special permission from your Dean's Designate (Department/Program or 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 if you are dropped from a course for failing to have the necessary prerequisites.”

### **Senate definition for the meaning of letter grades:**

- A+: 90-100 One could scarcely expect better from a student at this level
- A: 80-89 Superior work, which is clearly above average
- B: 70-79 Good work, meeting all requirements, and eminently satisfactory
- C: 60-69 Competent work, meeting requirements
- D: 50-59 Fair work, minimally acceptable
- F: below 50 Fail

### **Course Description**

This course focuses on cells' functional organization and physiology with special reference to cell communication mechanisms, intracellular signaling pathways, cellular membranes, metabolism, cell motility, and cell specializations. The course introduces students to the interpretation of primary literature and discusses current developments in the field of cell biology.

### **Course Outcomes**

Upon successful completion of this course, students will be able to:

1. Describe and identify the fundamental signaling pathways involved in cell fate and cell proliferation.
2. Analyze a given experiment and predict the outcome given the knowledge of cell signaling pathways acquired through lecture.
3. Summarize and interpret primary literature in the form of an oral presentation.
4. Link together concepts from multiple disciplines, including cell biology, biochemistry, genetics, and developmental biology.

## Course Materials

Optional Textbook: Lodish et al. Molecular Biology of the Cell, 9<sup>th</sup> Edition or later (optional; e-book).

Students are responsible for checking the course site (<https://westernu.brightspace.com>) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class. All course material will be posted to OWL: <https://westernu.brightspace.com>

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.

## Evaluation

*Electronic devices are NOT allowed during midterms or final examinations.* Phones, tablets, or laptops must be off or switched to Airplane mode during 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 this website: [https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_undergrad.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf).

- Lecture midterm 1 (**non-cumulative**) - **15%** In the event of missing this midterm, the weight will be transferred onto your final exam, 15+40.
- Lecture midterm 2 (**non-cumulative**) - **25%** **An Essential Requirement of this course.** In the event of missing this midterm, you will have to take the scheduled makeup (see below)
- Tutorial presentation - **15%** **An Essential Requirement of this course.**
- Tutorial participation - **5%** **If you miss a tutorial, you will be required to attend another section.**
- Final cumulative exam - **40%** **An Essential Requirement of this course, scheduled by the Registrar.**

**Midterms are during lecture times – 50 minutes long and the final, scheduled by the Registrar, is 2.0 hrs long.**

The only make-up for the second midterm will be scheduled as early as possible following the missed midterm. **There will be no make-up for the first evaluation, and the 15% will be added to the final exam. The format of the make-up exam may be different. All requests for Academic Consideration must be made using the [Student Absence Portal](#) within 48 hours after the assessment date.**

## Lecture Topics and Schedule (tentative schedule only, topics may change)

Introduction to Cell Signaling pathways
Hydrophobic signaling pathways – Retinoic Acid
GPCRs, light vision, Cre-lox and RTK signaling
EGF signaling, <i>C. elegans</i> vulva differentiation and cell cycle
AKT signaling in cell proliferations and apoptosis
Apoptosis and Ca <sup>2+</sup> signaling
Protein degradation pathways and canonical Wnt signaling
Non-canonical Wnt signaling
Autophagy
mTOR signaling
Hedgehog signaling
Signaling through the primary cilia
Hippo and Notch signaling
Neurodegenerative diseases
Insulin signaling
ROS and redox signaling
Redox signaling in the context of other signaling pathways
Pathogens and their effects on cell signaling pathways

## Course Website

### 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](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/](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 normally 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:

- **The final exam, held during the Exam Period**

- **Tutorial presentation** (Designated by the instructor as the one assessment that always requires documentation when requesting Academic Consideration). In the event that you miss your tutorial presentation date with approved Academic Consideration, you will be rescheduled to present at the next available date.

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.

Scheduled office hours and/or the **OWL Forum** (<https://westernu.brightspace.com>) **are the primary ways to ask questions regarding lecture material**; TAs will be monitoring the Forum regularly, and it is encouraged that other students address questions from their peers.

### **Tutorials & Tutorial Schedule**

Students may choose to miss the tutorials in which they are **NOT** presenting; however, they will be required to attend an alternate tutorial section and have the proper documentation/accommodation (See Below). **Tutorial presentations are an essential course requirement and, as such, absence requires approved academic consideration. Attendance is required; see below.** Your tutorial partners for presentations will be assigned randomly by one of the TAs; assignments will be posted on OWL.

Tutorial Room Assignments:

Section 002 = Mondays

Section 003 = Thursdays

Section 004 = Fridays

Section 005 = Fridays

Tutorials are held as listed above. You **MUST** attend and sign in at the end of each tutorial in order to be awarded the 5% tutorial participation. **Missing a SINGLE tutorial without having an approved academic consideration or leaving a tutorial early without approved academic consideration will result in a mark of ZERO (0) for the ENTIRE participation mark.** Note that in all cases where documentation (medical or otherwise) is required, it can *only* be collected via the student absence portal.

#### Presentation Guidelines:

Students will present in groups of 2, a 15-minute (plus 3 minutes of questions) presentation summarizing, interpreting, and critiquing a primary research article discussing a topic in cell biology. In the event of a tutorial having an odd number of students, a group of 3 may be assigned, where students will be required to present a 22-minute presentation.

Students will send their respective TA a PDF of their chosen research article for approval **AT LEAST 7 days prior to the presentation date.** Failure to send an article for approval by that time will result in an automatic **5% deduction** from the tutorial presentation. If the TA deems your article not suitable for presentation, you will be given 1 additional day per submitted article to produce an additional article without facing the **5% deduction**.

Students who are not presenting are required to participate in the tutorial by asking the presenters questions during the question period and are required to provide the presenters with constructive feedback on their presentation skills through anonymous comment sheets that will be compiled by the TAs and given to presenters at the end of the term.

### **Absences from Final Examinations**

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.

You may also be eligible to write the Special Exam if you are in a “Multiple Exam Situation” (e.g., more than 2 exams in a 23-hour period, more than 3 exams in a 47-hour period).

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/advising/>

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](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](mailto: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 if you have any questions regarding accommodations.

[http://academicsupport.uwo.ca/accessible\\_education/index.html](http://academicsupport.uwo.ca/accessible_education/index.html)

Learning-skills counsellors at the Student Development Centre (<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/>

### **Emailing Policy**

Students are encouraged to use the OWL Forum as their primary way of asking questions related to lecture material. Please use this forum for a lecture-related question. When emailing after regular

working hours allow 24 hours before expecting a response. Emails sent on a weekend will be answered 24 hours after the next business day. **Any email received where the question can be answered by reading the course outline will not be returned!** Likewise, no emails or forum posts will be addressed 24 hours before the midterm and final exam.

Inappropriate language on the Forum or in emails will not be tolerated under any circumstances and will be reported.

### **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%20Accommodation\\_disabilities.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic%20Accommodation_disabilities.pdf)

### **Support Services**

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if you have any questions regarding accommodations.

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### **How to Succeed in this Course**

This course will be challenging to the best of students as it is often the first time interacting with primary research as well as understanding complex concepts at a cellular level. To do very well in this course, you **MUST** attend all lectures, and you are encouraged to ask questions on the forum and/or to attend office hours if there is anything not clear to you. There are **NO** taped lectures and missing an exam and not following the appropriate rules will result in a 0, no exceptions!

Try not to think of this course **in a linear fashion**; there are overlapping concepts between almost all the signaling pathways and diseases we will discuss, so try and identify where those connections are in the lecture material. Also, do not forget what you have learned from previous courses in genetics, physiology and biochemistry, as they are just as relevant in those classes as they are in this one; everything is connected! Finally, be aware of deadlines and expectations; as an example, just showing up to all the tutorials is an easy 5%, do not lose it for being lazy!

**This syllabus will be posted on the OWL website assigned to the course.**