

Physiology and Pharmacology/Physiology and Pharmacology

Animal and cell modeling of development and disease

PHYSPHARM 4440B

Course outline for Winter 2023



Although this academic year might be different, Western University is committed to a **thriving campus**. We encourage you to check out the [Digital Student Experience](#) website to manage your academics and well-being. Additionally, the following link provides available resources to support students on and off campus: <https://www.uwo.ca/health/>.

1. Technical Requirements (if joining the available stream):



Stable internet connection



Laptop or computer



Working microphone



Working webcam

2. Important Dates and Course Overview:

Classes Begin	Classes End
Monday, January 9, 2023	Monday, April 10, 2023

* March 7, 2023: Last day to drop a second-term half course without penalty

Reading Week	Study day(s)	Exam Period
February 18–26	April 11-12	April 13-30

This course examines the use of established and emerging cell and animal models to study developmental and disease processes. From transgenic mice, to CRISPR-Cas9, to rapid screening of drugs for pharmaceutical testing, the understanding of how model systems can be utilized to evaluate normal development and physiology as well as pathologies.

3. Contact Information

Course Coordinator	Contact Information
Christopher Pin	cpin@uwo.ca

Instructor(s) or Teaching Assistant(s)	Contact Information
Dean Betts	dean.betts@schulich.uwo.ca
Tom Drysdale	tadrysda@uwo.ca

4. Course Description and Design

Course Objectives:

The main objective of this course is to introduce students to the development and characterization of preclinical models used in physiology and disease-based research. Sessions will focus on improving the ability of students to read, understand, and discuss primary scientific literature, and provide students with an opportunity to conceptually translate their knowledge on model development to solve problems/answer questions related to physiology and, pharmacology. The course material will include pre-recorded videos, didactic lecturing, analysis of primary research journal articles and class presentations/discussions. **Students are expected to come prepared to work in groups and discuss, in class, the content of pre-recorded videos and journal articles provided. This will require independent work outside of the lectures.** The lectures will focus mainly on how preclinical models are developed and used for understanding fundamental developmental, physiological, and pathological processes (see schedule).

Mode	Dates	Time	Frequency
In class, FIMS Nursing Building (FNB-2210)	Thursday; 12:30-2:20 pm	2 hours	weekly
Virtual asynchronous information will be provided	weekly	15 minutes	weekly

- Asynchronous pre-work must be completed prior to in class sessions
- Attendance at in class sessions is required

All course material will be posted to OWL: <http://owl.uwo.ca>. Any changes will be indicated on the OWL site and discussed with the class.

If students need assistance, they can seek support on the [OWL Help page](#). Alternatively, they can contact the [Western Technology Services Helpdesk](#). They can be contacted by phone at 519-661-3800 or ext. 83800.

[Google Chrome](#) or [Mozilla Firefox](#) are the preferred browsers to optimally use OWL; update your browsers frequently. Students interested in evaluating their internet speed, please click [here](#).

5. Learning Outcomes

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

- understand various pre-clinical models used in research and therapeutics
- identify the various techniques/technologies utilized to study tissue/organ development and correctly apply these techniques to address specific hypotheses
- identify research goals and hypotheses within a scientific publication
- create testable models and hypotheses and design appropriate, controlled experiments to test these hypotheses
- work in a small group to critically discuss primary research publications

6. Course Content and Schedule

Week	Dates	Topic*	Instructor
1	January 12 th	Introduction to course and animal/cell models	C. Pin
2	January 19 th	Mouse knockouts	C. Pin
3	January 26 th	Non-mammalian animal models	T. Drysdale
4	February 2 nd	Maternal knockout models in mice	D. Betts
5	February 9 th	Development of stem cell/organoid models	D. Betts
6	February 16 th	Midterm	In class
7	February 23 rd	Reading Week	N/A
8	March 2 nd	Genetic manipulation and experimental methods in non-mammalian models	T. Drysdale
9	March 9 th	Presentations	
10	March 16 th	Presentations	
11	March 23 rd	Systems biology in non-mammalian models	T. Drysdale
12	March 30 th	iPS cell modelling to understand disease The use of iPS cells for rapid drug screening	D. Betts
13	April 6 th	Organoids as a model for personalized medicine	C. Pin
	April 10 th	Written assignment due	
	April 21 st	Feedback on assignments provided	

7. Online Participation and Engagement

Currently, the expectation is that all lectures will be in person and, at times, involve students working together in small groups. If we need to pivot to partial or complete online learning, sessions will still be held synchronously, and group work will still occur. If this becomes a reality, then ***the expectations regarding student participation and engagement will remain the same***. All students are expected to:

- participate and engage with content as much as possible
- participate during in class sessions via audio and chat features and be able to share their screen for participation purposes
- Students should participate by interacting in the forums with their peers and instructors

8. Evaluation

Below is the evaluation breakdown for the course. Any deviations will be communicated.

Assessment	Format	Weighting	Due Date
Midterm exam	In class	20%	February 16 th
Model development	10 minute in class presentation	10%	March 9 th or 16 th
Provide the “next experiment” based on provided manuscripts	Two page written assignment	25%	April 10 th
Final exam	Essay/short answers	40%	During exam period
Participation	Combination of asking and answering questions and completing online content	10%	

- Written assignment is due at 11:55 pm EST unless otherwise specified
- Written assignment will be submitted to Turnitin (statement in policies below)
- Students will have unlimited submissions to Turnitin
- Rubrics will be used to evaluate assessments and will be posted with the instructions
- After an assessment is returned, students should wait 24 hours to digest feedback before contacting their evaluator; to ensure a timely response, reach out within 7 days

Short description of evaluations

Midterm exam: Held in class and will cover material presented in the first five lectures describing animal/cell-based models. The exam will consist of short answer questions that will test knowledge from these lectures as well as applicability to animal/cell modeling.

Assignment #1 – Model Development: Students will work individually to develop a novel cell/animal model that will eventually be used to answer a specific research question stemming from a recent manuscript. The PowerPoint presentation will be 10 minutes long and describe (1) the key findings from the paper, (2) the next question to be asked, (3) the model to be developed. There will be 5 minutes of feedback provided from students and faculty.

Assignment #2 – Next Experiment: Based on feedback from Assignment #1, students will use the novel animal/cell models to answer the next question that stems from a recent manuscript. Students will choose from a series of papers provided by the faculty that identify genetic mutations found within humans. These mutations may be linked to a genetic disorder or disease and the student will be asked to design a cell or animal model that can be used to determine the functional relevance of the gene as it relates to specific physiological or pathological outcomes.

Final Exam: Short and long style essay questions that will test the student’s ability to expand upon the information given in the lectures. Exam questions will typically ask students to suggest experiments and provide results that pertain to models or hypotheses discussed in the lectures.

Participation: Students will be required to participate in the course through asking/answering questions in the context of student presentations or during lectures. They may also be required to contribute to online forums provided on the OWL website.

Click [here](#) for a detailed and comprehensive set of policies and regulations concerning examinations and grading. The table below outlines the University-wide grade descriptors.

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

Information about late or missed evaluations:

- Late assessments without academic accommodations will be subject to a late penalty 10%/day
- An assessment cannot be submitted after it has been returned to the class; If academic accommodation has been provided, an alternate assessment will be assigned that involves developing a set of experiments from a manuscript that had not previously been provided.
- One scheduled make-up exam will be offered
- If the make-up assessment is missed, the student will receive an INC and complete the task the next time the course is offered

INC (Incomplete Standing): If a student has been approved by the Academic Counselling Office (in consultation with the instructor/department) to complete term work at a later date, an INC will be assigned. Students with INC will have their course load in subsequent terms reduced to allow them to complete outstanding course work. Students may request permission from Academic Counselling to carry a full course load for the term the incomplete course work is scheduled.

SPC (Special examination): If a student has been approved by the Academic Counselling Office to write a Special Examination and the final exam is the only outstanding course component, an SPC will be assigned. If the class has a makeup exam, the student is expected to write the makeup exam. If the class doesn't have a makeup exam or the student misses the makeup exam for reasons approved by the Academic Counselling Office, the student will write the exam the next time the course is offered. Outstanding SPCs will reduce the course load for the term the exam is deferred as outlined in [Types of Examinations](#) policy.

9. Communication:

- Students should check the OWL site every 24 – 48 hours
- A weekly update will be provided on the OWL announcements
- Students should email their instructors using provided emails
- Emails will be monitored daily; students will receive a response in 24 – 48 hours depending on the weekend
- This course will use the OWL forum for discussions
- Students should post all course-related content on the discussion forum so that everyone can access answers to questions
- The discussion forums will be monitored daily by instructors

10. Office Hours:

There are traditionally no office hours offered. However, students should contact professors directly to book an appointment which can occur via zoom or in person.

11. Resources

- All resources will be posted in OWL
- No required textbook but primary literature will need to be accessed

12. Professionalism & Privacy:

Western students are expected to follow the [Student Code of Conduct](#). Additionally, the following expectations and professional conduct apply to this course:

- Students are expected to follow online etiquette expectations provided on OWL
- All course materials created by the instructor(s) are copyrighted and cannot be sold/shared
- Recordings are not permitted (audio or video) without explicit permission
- Permitted recordings are not to be distributed
- All recorded sessions will remain within the course site or unlisted if streamed

13. How to Be Successful in this Class:

Students enrolled in this class should understand the level of autonomy and self-discipline required to be successful.

1. Invest in a planner or application to keep track of your courses. Populate all your deadlines at the start of the term and schedule time at the start of each week to get organized and manage your time.
2. Make it a daily habit to log onto OWL to ensure you have seen everything posted to help you succeed in this class.
3. Follow weekly checklists created on OWL or create your own to help you stay on track.
4. Take notes as you go through the lesson material. Keeping handwritten notes or even notes on a regular Word document will help you learn more effectively than just reading or watching the videos.
5. Connect with others. Try forming an online study group and try meeting on a weekly basis for study and peer support.
6. Do not be afraid to ask questions. If you are struggling with a topic, check the online discussion boards or contact your instructor(s) and or teaching assistant(s).
7. Reward yourself for successes. It seems easier to motivate ourselves knowing that there is something waiting for us at the end of the task.

14. Western Academic Policies and Statements

Absence from Course Commitments

A. Absence for medical illness:

Students must familiarize themselves with the [Accommodation for Illness Policy](#).

A student seeking academic accommodation for any **work worth a maximum of 10%, i.e., a maximum of one missed seminar in which you are on one of the debate groups**, must contact the instructor.

The missed seminar work will be reweighted on the remaining seminars. Instructors will use good judgment and ensure fair treatment for all students when considering these requests. You are not required to disclose details about your situation to your instructor; documentation is not required in this situation, and you should not send any pictures to your instructor.

If you are unable to meet a course requirement for any **work worth 10% or greater** due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to the Academic Counseling as soon as possible and contact your instructor immediately. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed. Please note that the format of a make-up test, exam, or assignment is at the discretion of the course coordinator.

A student requiring academic accommodation due to illness should use the Student Medical Certificate when visiting an off-campus medical facility or request a Record's Release Form (located in the Dean's Office) for visits to Student Health Services. The form can be found at: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf

B. Absence for non-medical reasons:

Student absences might also be approved for non-medical reasons such as religious holidays and compassionate situations. Please review the policy on [Accommodation for Religious Holidays](#). All non-medical requests must be processed by Academic Counselling. Not all absences will be approved; pay attention to the academic calendar and final exam period when booking any trips.

C. Special Examinations

A Special Examination is any examination other than the regular examination, and it may be offered only with the permission of the Dean of the Faculty in which the student is registered, in consultation with the instructor and Department Chair. Permission to write a Special Examination may be given on the basis of compassionate or medical grounds with appropriate supporting documents. To provide an opportunity for students to recover from the circumstances resulting in a Special Examination, the University has implemented Special Examinations dates. These dates as well as other important information about examinations and academic standing can be found [here](#).

Academic Offenses

"Scholastic offences are taken seriously, and students are directed [here](#) to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence.

Accessibility Statement

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Accessible Education (AE) at 661-2111 x 82147 for any specific question regarding an accommodation or review [The policy on Accommodation for Students with Disabilities](#).

Correspondence Statement

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. You can read about the privacy and security of the UWO email accounts [here](#).

Turnitin and other similarity review software

All assignments will be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. Students will be able to view their results before the final submission. 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 Western University and [Turnitin.com](https://www.turnitin.com).

15. BMSUE Academic Policies and Statements

Cell Phone and Electronic Device Policy (for in-person tests and exams)

The Schulich School of Medicine & Dentistry is committed to ensuring that testing and evaluation are undertaken fairly across all our departments and programs. For all tests and exams, it is the policy of the School that any electronic devices, i.e., cell phones, tablets, cameras, or iPod are strictly prohibited. These devices **MUST** be left either at home or with the student's bag/jacket at the front of the room and **MUST NOT** be at the test/exam desk or in the individual's pocket. Any student found with one of these prohibited devices will receive a grade of zero on the test or exam. Non-programmable calculators are only allowed when indicated by the instructor. The program is not responsible for stolen/lost or broken devices.

Copyright and Audio/Video Recording Statement

Course material produced by faculty is copyrighted and to reproduce this material for any purposes other than your own educational use contravenes Canadian Copyright Laws. You must always ask permission to record another individual and you should never share or distribute recordings.

Rounding of Marks Statement

Across the Basic Medical Sciences Undergraduate Education programs, we strive to maintain high standards that reflect the effort that both students and faculty put into the teaching and learning experience during this course. All students will be treated equally and evaluated based only on their actual achievement. **Final grades** on this course, irrespective of the number of decimal places used in marking individual assignments and tests, will be calculated to one decimal place and rounded to the nearest integer, e.g., 74.4 becomes 74, and 74.5 becomes 75. Marks **WILL NOT** be bumped to the next grade or GPA, e.g. a 79 will **NOT** be bumped up to an 80, an 84 **WILL NOT** be bumped up to an 85, etc. The mark attained is the mark you achieved, and the mark assigned; requests for mark "bumping" will be denied.

16. Support Services

The following links provide information about support services at Western University.

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.

[Academic Counselling \(Science and Basic Medical Sciences\)](#)

[Appeal Procedures](#)

[Registrarial Services](#)

[Student Development Services](#)

[Student Health Services](#)