

CAPS 421 Course Syllabus

Introduction

A 4th year undergraduate course to explore recent advancements in cellular and molecular physiology that have revolutionized our understanding of cell function in health and disease. Intended for Honours students in Cellular, Anatomical and Physiological Sciences or other life sciences. This lecture is offered online on Mondays and Wednesdays from 2:00 – 4:00 pm PST. The lecturer will be available for at least 30 minutes after each class to answer questions – these are considered office hours. Additional time can be arranged on an individual basis if needed. Each class will focus on a concept and the presentation of 1-2 seminal papers. The course instructor will provide an introduction to the concept and present the papers. Students will then be responsible for leading the discussion on select papers. The lecturers encourage class discussion and will provide ample opportunity for in-class questions and discussion. Course material and communications are all accessible through the UBC Canvas LMS.

Course Directors / coordinators:

I. Robert Nabi (ivan.robert.nabi@ubc.ca) and T. Michael Underhill (tunderhi@brc.ubc.ca)

Assessment, Evaluation & Grading:

Distribution of Marks

Short quizzes on assigned paper(s) at beginning of class	15%
One publication, provide questions and lead discussion	15%
One short write-up on above presented paper	20%
<u>Two exams (introductory content plus 3-4 papers from each of the 2 sections)</u>	<u>50%</u>
Total Mark	100%

Classes:

All classes will be carried out on Zoom at the indicated time in synchronous mode with office hours to be held after class. The first 20-30 mins will involve a brief overview of the concept to be covered followed by the introduction and discussion of 2 seminal papers related to the concept. Following each paper presentation, there will be a short student led discussion, where they will be responsible for presenting and leading a class discussion around 3 questions (no more than 6 slides). At the end of the lecture, there will be a brief wrap-up session.

Quizzes:

Brief quizzes will be held on the assigned papers (maximum 2/lecture). The quiz will consist of 5-6 short answer questions (mix of multiple choice, true/false, short answer) that is anticipated to take approximately 5 mins. The quiz will be conducted on Canvas.

Assignment:

Each student will be responsible for preparing a short summary (no more than 2 pages) of the paper (same one that was used for their discussion questions) including a general introduction to the subject, presentation of the selected paper, interpretation, conclusion and identification of weaknesses. The student is expected to demonstrate a clear understanding of the paper and its relevance to the field and will be evaluated on the overall clarity and quality, as well as their critique of the paper. In this way, the students will not only get an understanding of the fundamental findings that advanced our knowledge of cell physiology, but also the technical advance(s) needed for its development. The assignment is due 2 weeks after their in-class presentation.

Midterm/Final Exams:

Two exams will evaluate the content covered in the lectures. The mid-term exam will cover the first half of the course and the final exam will cover only the 2nd half of the course. The exams will be held during in a regular scheduled class and are expected to take no more than 2 hours. The exam will contain a combination of multiple choice and short answer.

Academic Concession:

Please see:

<https://students.ubc.ca/enrolment/academic-learning-resources/academic-concessions>

Academic concessions are not guaranteed. Academic course work during the term (participation, quizzes, and the respiratory midterm exam) is at the discretion of your instructor.

Please contact the course directors if you anticipate or experience any problems with software used in labs/class, or in accessing online content, or with synchronous online lab/class attendance. We will strive to work with you to complete labs/classes, in the event that you encounter connectivity issues.

Students will not be granted concession for conflicting responsibilities with lab/class times. Students must resolve such conflicting responsibilities in advance of the lab/class or assignment. In the event of medical, changing responsibilities or compassionate grounds, the student must communicate with course directors to determine a suitable course of action.

Missed Classes:

All students are required to attend classes. If you miss a class you may request access to the lecture recording.

Missed Quiz:

Students can request concession to miss only two quizzes without penalty during the entire term for valid medical and compassionate grounds only. Students will not be granted concession for conflicting responsibilities. Missed quizzes will receive a mark of zero.

Missed Midterm Exam:

Students may request an academic concession from the course coordinator along with supporting documentation for valid medical and compassionate grounds only. If concession is granted, the midterm exam must be completed within term. Be aware that students are not granted concession for conflicting responsibilities for this course. Students must resolve such conflicting matters in advance of the midterm examination. Missed exams that are not granted concession will receive a mark of zero.

Missed Final Exam:

Concessions for the final exam are granted through request for deferred standing from Faculty of Science Advising no later than 48 hours after the missed final exam. The exam will be rescheduled during the Deferred Standing Exam period (TBD). Missed exams that are not granted concession will receive a mark of zero.

Course Schedule

1. Welcome and Introduction - Sept. 9 (Nabi and Underhill)
- Part 1 – Stem cells in health and disease (Underhill)**
2. Stem cells and aging (Underhill; Sept. 14, 16, 21, 23)
 - a. Accelerated aging conditions – Progeroid Syndromes
 - b. Induced pluripotent stem cells – models for human disease
 - c. Cellular basis of progeria and novel therapies – defects in tissue homeostasis, renewal and regeneration
 - d. Treatments for genetic diseases – from biology to therapeutics
3. Stem cells and tissue regeneration (Underhill; Sept. 28, 30)
 - a. Tissue regeneration – restoration of tissue/organ function

- b. Tissue regeneration and the liver – an interesting paradigm
- 4. Stem cells, tissue renewal and cancer (Underhill; Oct. 5, 7)
 - a. Intestinal tissue renewal and stem/progenitor cells
 - b. Intestinal tissue stem/progenitor cells and origin of cancer

First half review session Oct. 19

Mid-term exam – Oct. 21

Part 2 – Inside the cell (Nabi)

- 5. Trafficking in the secretory pathway (Nabi; Oct. 26, 28 and Nov. 2)
 - a. Endoplasmic reticulum organization and function
 - b. Endoplasmic reticulum quality control and CFTR in cystic fibrosis
 - c. The Golgi and protein glycosylation in cancer
- 6. Plasma membrane domains and endocytosis (Nabi; Nov. 4, 9, and 16)
 - a. Plasma membrane organization and receptor signaling
 - b. Endocytosis and the CLIC pathway
 - c. Lysosomes and autophagy: ESCRT and Parkinson's disease
- 7. Cancer and super-resolution microscopy (Nabi; Nov. 18 and 23)
 - a. Cancer progression: Epithelial-mesenchymal transition and invadopodia
 - b. Single molecule localization microscopy

Second half review session Nov. 25

Final exam – covers 2nd half material only Dec. 2nd.

Recommended Textbook/Reference Materials:

There are no recommended textbooks, all course content will be derived from primary scientific articles and reviews from journals. This material will be provided to the students.

UBC Statement of Academic Integrity:

The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply if the matter is referred to the President's Advisory

Committee on Student Discipline. Careful records are kept in order to monitor and prevent recurrences.

The information contained in the course syllabus, other than the grade and absence policies, may be subject to change with reasonable advance notice, as deemed appropriate by the instructor.