

Chemistry 560 – Cell-Based Assays for Drug Loaded Nanoparticles

Spring 2019 – February 12th through March 13th

Prof. Jeremy Wulff | wulff@uvic.ca

Lectures: Tuesdays and Wednesdays 1:00pm–2:20pm PST

Location: Clearihue B021 (Note room changed to B019 for Feb 27th)

CourseSpaces URL: tbd

Summary:

This module is intended to provide students with an awareness of *in vitro* cell-based assays used to assist in drug development. Although the emphasis is intended to be on assays of specific utility in characterizing drug loaded nanoparticles, the content will be generally applicable to the *in vitro* characterization of any drug candidate.

The material for this module will be delivered through a series of eight 1.5-hour sessions. The first two lectures will be presented by Professor Wulff, while the remaining sessions will devoted to student presentations on a variety of topics related to cell-based assays. Each student presentation will be 50 minutes, with the remaining time in the 1.5-hour timeslot devoted to discussion of that day's assay method.

In addition to crafting a 50 minute lecture on one of the assigned topics, each student will be required to generate a short homework assignment for completion by the other students in the class, along with a marking guide and grading rubric. Each assignment will be due at the beginning of the following class. Dr. Wulff will then evaluate the assignments according to the provided marking key. In this way, students will acquire practice at generating lecture-style content and in setting student assignments.

Students' final grades will be based on their performance on the homework, the quality of their assignment questions, and the effectiveness of their presentations. Grades will also be awarded for in-class participation. There is no final examination for this module.

Learning Objectives:

1. Learn modern cell based assay techniques.
2. Acquire a basic understanding of the execution, data collection, limitations, and data interpretation of cell based assays.
3. Acquire in-depth understanding of a particular assay.
4. Develop the ability to teach an assay technique to a class of students, including creation of: (1) a 50 minute lecture; (2) an appropriate assignment about the presented material; and (3) an answer key with marking rubric.

Evaluation and Grading:

Class presentation	50% – 35% in class presentation – 10 % assignment preparation – 5% answer key and marking rubric
Assignment #1 (from J. Wulff)	10%
Assignments #2–7 (from students)	30% (5% each)
Participation in in-class discussions	10%

Course Outline:

Week 1:

Feb 12 th , 2019 – J. Wulff	Course overview. Introduction to drug development and preclinical <i>in vitro</i> assays. Introduction to cell lines (primary vs. immortal, common cell lines). Introduction to standard anti-proliferative cell assays (EC ₅₀ vs GI ₅₀).
Feb 13 th , 2019 – J. Wulff	Anti-proliferative cell assays (data analysis and interpretation). p-Values and statistics. Introduce assignment #1. Assign presentation topics.

Week 2:

Feb 19 th , 2019	Assignment #1 due. (No class)
Feb 20 th , 2019	(No Class) UVic Graduate Student Research Day.

Week 3:

Feb 26 th , 2019	Student presentation #1.
Feb 27 th , 2019	**Note room change to B019 today only** Student presentation #2. Assignment #2 due.

Week 4:

March 5 th , 2019	Student presentation #3. Assignment #3 due.
March 6 th , 2019	Student presentation #4. Assignment #4 due.

Week 5:

March 12 th , 2019	Student presentation #5. Assignment #5 due.
March 13 th , 2019	Student presentation #6. Assignment #6 due.
March 18 th 2019	Assignment #7 due.

Possible Topics

- Motility and migration assays
- 3-D culturing methods (matrigel vs. collagen vs. other methods)
- Tumor spheroids (generation and maintenance)
- *In vitro* cancer stem cells and cancer progenitor stem cell experiments
- Microfluidics
- Proteomics (expression profiles)
- RNAseq/RT-qPCR
- Metabolomics
- Epithelial cell assays / CaCo & PUMA / membrane transport assays / blood brain barrier assays
- Cell Death assays (necrosis / apoptosis / necroptosis / autophagy)

Feel free to suggest additional topics.

Academic Integrity:

Instances of plagiarism, copying during exams, or other abuses of academic integrity will be dealt with according to the University of Victoria's academic integrity policy. (see: <https://web.uvic.ca/calendar2019-01/undergrad/info/regulations/academic-integrity.html>). The homework assignments should be completed individually (i.e. you should be writing up your answers by yourself) but I encourage students to discuss the lecture material and course content before completing each assignment.

Equity and Good Behaviour:

The University of Victoria promotes a safe, respectful and supportive learning, working, and living environment. University policies prohibit discrimination, harassment, and sexualized violence. The Equity and Human Rights office (EQHR) is a resource for all UVic community members, including students. EQHR provides education, information, assistance and advice in aid of building and supporting an inclusive and respectful campus. When issues and concerns arise, EQHR assists those involved through the range of support and resolution options available under the Sexualized Violence Prevention and Response policy and Discrimination and Harassment policy. EQHR staff are available by appointment—contact information and resources can be found at <https://www.uvic.ca/equity/>.

The Department of Chemistry expects everyone participating in university activities in the department to model respectful behaviour and abide by applicable University policies. For more information please contact: Sandra Carlson, Department Secretary: dsecchem@uvic.ca or in person at Elliot 301.