

*This syllabus is a general representation of the course as previously offered and is subject to change.*

## **BIOL 441 – Advanced Topics in Cell Biology**

General Course Syllabus (as of June 2023)

### **About the Course:**

**Course Description:** The course is an analysis of the molecular mechanisms of intracellular protein trafficking between organelles concentrating on animal cell systems. Several intracellular trafficking pathways are studied in detail, including vesicle trafficking and protein secretion. As viruses hijack the host transport machinery to spread infection, this course also covers how viruses exploit these cellular pathways for their own benefit.

Lectures review protein targeting/trafficking and the key methods used to study cells, organelles, and the intracellular trafficking of proteins. Through the activities, students have the opportunity to read and discuss classical research papers and work in groups to present a unified picture of how protein targeting and trafficking to different organelles occurs and how viruses use these pathways.

**Course Format:** Lecture

**Credits:** 3

**Co-requisites:** One of BIOL 340, BIOL 341 and one of BIOL 361, BIOL 362, BIOL 370, BIOL 371.

### **Course Learning Outcomes:**

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

- Describe major techniques in cell biology and how they are applied for the study of intracellular trafficking of proteins and viruses.
- Dissect complex "vesicle trafficking" and "protein sorting" systems into component parts and to discover how these components function together.
- Read and interpret research papers in "Cell Biology".
- Explain the advantages and disadvantages of various "experimental approaches" and show how these same types of biological approaches are used to address different questions.
- Develop critical thinking and presentation skills.

## Textbooks and Additional Resources:

**For Background Reading:** Alberts et. al., "Molecular Biology of the Cell", 4th or 5th edition.

- Students do not need to buy the text. Copies of MBOC 5th edition are on reserve in Woodward Library, and the 4th edition is online at the NCBI web site (<http://www.ncbi.nlm.nih.gov>).

## Additional readings:

- Students will read "reviews" and papers from the primary research literature posted on the course website ([canvas.ubc.ca](http://canvas.ubc.ca)).
- Student projects will involve library research.

## Evaluation:

Assessment	Weight	Notes
Midterm	26%	In-class exam
Assignment #1	30%	Group presentation + Class activity
Assignment #2	30%	Group research project: Written (15%) + Oral (15%)
Other activities	14%	Worksheets and other class activities

There is **no final exam**.

**Assignment #1:** Group presentation and in-class activity.

Students are assigned a topic on cellular uptake/organelle transport, and as a group they would use the textbook and any recent reviews or papers to learn their assigned topic. Each group will present the detailed mechanisms of their topic to the class and participate in an in-class activity.

**Assignment #2:** Group Research Projects.

Students are assigned a topic and related questions on how viruses or bacteria are targeted to different cellular compartments. This project has both group- and individual components for students to complete a library research, then share their findings as a handout for the class (written part) and as an oral presentation (oral part).

## Schedule of Topics:

### Approximate schedule:

1. (Week 1) COURSE BEGINS —organizational meeting only
2. (Weeks 1-2) Lectures on: Mechanisms of vesicular traffic between organelles
3. (Weeks 3-4) Lectures on: How cells are studied (experimental approaches) and
4. (Weeks 4-5) Discussion of classical research papers that elucidated the secretory pathway
5. (Week 6) Review section & **MIDTERM** (in class)
6. (Week 7) Lectures continued (techniques to study intracellular transport; preparation for presentation and debates)
7. (Weeks 8-9) **Student presentations of Assignment #1** (dates will be announced in class)
8. (Week 9) **Written part of Student Research Project due**
9. (Weeks 10-13) **Student Research Project ORAL Presentations** (dates will be announced in class)
10. (Week 13) Last day of class

## **University Policies:**

*UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence.*

*UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom.*

*UBC provides appropriate accommodation for students with disabilities and for religious, spiritual and cultural observances.*

*UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions.*

*Details of the policies and how to access support are available on [the UBC Senate website](#).*