

Phys348: Frontiers in Physics (Fall, 2022)

Class:	Tuesdays & Thursdays 14:00-15:30 Hennings Room 304
Professor:	Fei Zhou
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Office Hours:	TBA
Webpage:	https://phas.ubc.ca/~feizhou/phys348,2022
CANVAS Learning Management System:	http://canvas.ubc.ca Login with your Campus Wide Login (CWL), then choose <i>PHYS 348 Frontiers in Physics</i> .

Main learning objectives

- 1) Develop skills to explore various frontiers in modern physics research under supervision. Lectures include: a) *hot* topics in our current research; b) fundamental research achievements that have revolutionized our knowledge and our current understanding of how things work; c) applied research achievements that lead to huge direct applications in technologies in our modern society.
- 2) Develop self-guided exploration skills to self-explore various frontiers in physics. (This part of exploration, each student will have an opportunity to choose topics of their interests and present to the whole class. See below for details)
- 3) Develop communication skills that include the following aspects.
 - a) poster presentation skills;
 - b) oral presentation skills;
 - c) written presentation skills.

General Information

A) Information on the structure of the course:

- 1) This course will be done in a combination of lecture/seminar style and our goal is to develop research and communication skills, while exploring current "hot" research topics in physics/astronomy. We'll start off working on our scientific research literacy and effective scientific communications skills. Then the course will turn more seminar-style, as students collectively select a few interesting research topics to explore. Each student will choose two research topics. For one of these topics, you'll make an oral presentation to the class and write a scientific paper. For the other topic, you'll do a poster presentation (we'll have 3 poster session classes) and write a popular science style article.
- 2) By the end of the course, students should feel that they have the skills necessary to read and comprehend published scientific refereed research

articles, give scientific presentations, write scientific reports and have experience with poster presentations, similar to those you may present at a scientific conference, or a progress/project report at a high tech firm. Students will have experience performing the background investigations and reviews scientists typically perform at the beginning of a research projects: students taking the PHYS 349 project, PHYS 449 thesis, co-op job projects, independent studies, MSc project will be well prepared to embark on research of their own. Students will have studied and reviewed two current (appropriate) physics or astronomy research topics of their choice, made an oral presentation and a poster presentation. Students will have written a short scientific review article and a newspaper/popular science style article on these research topics. Student participation is essential in all aspects of the course.

Majors students will be well prepared for PHYS 349/ASTR 349 - Directed Studies in Physics/Astronomy (Majors research project).

Honours students will be well-prepared for PHYS 449/ASTR449 - Honours Thesis (Honours research project). All should find this to be useful preparation for your next career step.

B) Information on Exploration of Current "HOT" Research Topics

- One major goal of this course is to explore current, interesting physics and astronomy research.
- There will be lectures, given either by the professor and/or one or two invited speakers on current research in a range of phys/astro fields, in applied physics, and closely related fields.
- Check out the [Physics and Astronomy Department Colloquia](#) and take advantage of world experts whom we invite to visit our department to share their research with us. Students are always welcome to all these guest visitors colloquia and seminars (and to the coffee/tea and cookies preceding each colloquium)
- Each student will select two topics he/she wishes to research and share with the class.

- Each student will write two term papers, and give an oral presentation and a poster presentation.
- The class size is typically small enough for discussion - all students are expected to participate in discussions and critique/analysis readings

Please note that student participation is crucial to this course: Students assess other's presentations and posters, provide constructive feedbacks, and discuss readings. ***This will contribute to 10% of your final grades.*** Students are required to email me in advance to explain any absences.

C) Information on Communication Skill Development:

- We'll be spending the first few weeks on learning research skills, learning how to prepare our talks/presentations and how to write technical papers.
- Learn effective communication skills - Most physics graduates will go on to careers in industry, teaching or academia where we will write technical reports and/or scientific publications, and present our work in business meetings or at conferences. We will spend several classes on technical writing and scientific presentation skills and will examine how to write (and publish) a scientific paper.
- You'll learn and practice using either [LaTeX](#) or [Word](#). You will prepare your 2nd paper in the format required by an actual physics journal.

D) Information on grade

	No Final Exam
	20% 5 assignments, 4% each
	5% reading quizzes
	15% Term Research Paper 1 (shorter review paper in form of an in-depth newspaper article)
	20% Term Research Paper 2 (publication-style research review paper)
	15% Poster Presentation
	15% Seminar Presentation
	10% Participation in discussions, and on quality of written feedback and assessments of your peers' presentations and posters.

The above grading scheme applies **ONLY** to students who have completed all four main course components: Both presentations, both papers. Any students who have not completed all four main components will fail the course, and their final mark will be the **LOWER** of: (the calculated mark using the above scheme, or 47%) - whichever is lower. **ie you cannot PASS this course if you omit any of the presentations or papers.)**