

University of Victoria
Department of Physics and Astronomy

PHYS329 - Intermediate Physics Laboratory

Spring 2026 Syllabus

We acknowledge and respect the Lək̓ʷəŋən (Songhees and X̱wəpsəm/Esquimalt) Peoples on whose territory the university stands, and the Lək̓ʷəŋən and WSÁNEĆ Peoples whose historical relationships with the land continue to this day.

Course Information

Section(s): A01

Unit Value: 1.5 Units

Course Schedule: Tuesday and Wednesday from 2:30pm-5:20pm

Classes on Tuesdays will consist of an approx. 1 hour lecture, followed by 2 hours of lab time.

Classes on Wednesdays will consist of a full 3 hours of lab time.

Prerequisites: Students must have completed PHYS229 and PHYS248 as a prerequisite for this course.

Instructor Information

Instructor: Travis Martin

Email: travismartin@uvic.ca

Students are expected to include “PHYS329” in the Subject line of their email, and include their name and student ID in the body of the email. Please allow up to 48h to respond to emails before re-inquiring. If you do not receive a response within 48h, it is possible that your email was missed - please email again.

Office Hours: TBD

In-Term Feedback: Student comments may be sent via email, however it is not possible for all feedback to be considered within the term.

Lab Coordinator: Andrew Macrae

Email: macrae@uvic.ca

Students are expected to include “PHYS329” in the Subject line of their email, and include their name and student ID in the body of the email. Please allow up to 48h to respond to emails before re-inquiring. If you do not receive a response within 48h, it is possible that your email was missed - please email again.

Modality Information

Lectures: Lectures will cover key concepts, skills and analysis techniques. Lectures will occur in the same room as the laboratory activities.

Labs: Labs will be completed in partners. Students may not switch partners. In the case of an odd number of students in the class, one student will work alone. It is likely that students will complete the experimental activities before the end of the lab period – in such cases, students are encouraged

to remain in the lab and work on the analysis and lab writeup in an environment where they can ask questions of lab instructors.

Accessibility Statement: Accessibility is critically important to ensure that all students can participate to their fullest extent possible. All course material is provided to students in digital format at the start of term. Students with accessibility concerns are encouraged to discuss these concerns with instructors as soon as possible.

Technology Information

Course Webpage: <https://bright.uvic.ca/d2l/home/432639>

Other Technologies: This course may use Zoom for office hours and student meetings.

Students are expected to be familiar with Python programming in a Jupyter environment. Students may access a Jupyter programming environment at <https://jhub-astro.uvic.ca/>. Students may opt to use Jupyter environments on their own computers instead.

Digital Tools Policy: Students may use LLM Artificial Intelligence (such as ChatGPT) to assist with programming/coding elements of this course only. When used, the work assisted by the LLM AI must be properly cited in the submitted report. Students are responsible for ensuring that any code generated correctly addresses the task. Students may not use LLM AI for any research or writing components of this course. Students may not use Generative AI to create graphics or images. If an instructor suspects the improper use of AI for any submitted materials for this course, they may request a mandatory meeting with the student to discuss their work. The student will be expected to explain their process for generating the material, the outcome of which may result in a charge of academic dishonesty.

Course Schedule

Class	Activity	Date
1	Lecture 1 - Introduction, Histograms & Plotting	January 6
1	Lab 1 - Experiment 1	January 6
1	Lecture 2 - Uncertainty	January 7
2	Lab 2 - Experiment 1	January 7
3	Lecture 3 - Modelling	January 13
3	Lab 3 - Library Visit	January 13
4	Lab 4 - Experiment 1	January 14
5	Lecture 4 - Radiation	January 20
5	Lab 5 - Experiment 2	January 20
6	Lab 6 - Experiment 2	January 21
7	Lecture 5 - Hypothesis Testing	January 27
7	Lab 7 - Experiment 2	January 27
8	Lab 8 - Experiment 2	January 28
9	Lecture 6 - Hypothesis Testing II	February 3
9	Lab 9 - Experiment 3	February 3
10	Lab 10 - Experiment 3	February 4
11	Lecture 7 - Uncertainty II	February 10
11	Lab 11 - Experiment 3	February 10
12	Lab 12 - Experiment 3	February 11
13	Lecture 8 - Ethics	February 24
13	Lab 13 - Experiment 4	February 24
14	Lab 14 - Experiment 4	February 25
15	Lecture 9 - Scientific Writing	March 3
15	Lab 15 - Experiment 4	March 3
16	Lab 16 - Experiment 4	March 4
17	Lecture 10 - Experimental Design	March 10
17	Lab 17 - Experiment 5	March 10
18	Lab 18 - Experiment 5	March 11
19	Lecture 11 - Peer Review & Criticism	March 18
19	Lab 19 - Experiment 5	March 18
20	Lab 20 - Presentations[†]	March 17
21	Lab 21 - Experiment 5	March 24
22	Lab 22 - Experiment 5	March 25
23	Lab 23 - Experiment 5	March 31
24	Lab 24 - Experiment 5	April 1

[†] Depending on class progress, presentations may be shifted to Class 21 to give more preparation time.

Course Outcomes

Summary: This course covers intermediate skills in experimental physics. In the lab, the focus is on types of measurement equipment and the techniques used to improve precision and account for uncertainty. In the assessments, students will explore advanced techniques for analysis and communication of experimental results.

Essential Course Components:

- Students must complete and submit all five labs reports in order to be eligible to pass this course. If students are sick, time can be arranged outside of the standard lab period in order for data collection to occur. Students may not use the data collected by another person for performing their analysis. Students who do not submit all five lab reports will be assigned a grade of N.
- Students must achieve at least 50% in the final lab report to be eligible to pass this course. Students who receive a grade lower than 50% will be assigned a grade of F for the course, regardless of overall course grade.

Intended Learning Outcomes: By the end of this course, successful students should be able to...

- perform a calibration of a device and report the results of this calibration in terms of bias and uncertainty.
- determine model parameters using a least squares and χ^2 minimization approach.
- assess the quality of a model fit using χ^2 and R^2 measures.
- develop a model and describe the physical motivation for the model parameters.
- understand how to properly communicate physical quantities and model parameters in a scientific publication.
- understand the difference between systematic and statistical uncertainties, and the conditions by which each arise in a scientific experiment.
- account for the systematic uncertainty and systematic bias present in an experiment.
- use the results of an experiment to develop & communicate suggestions for future work on an experiment.
- independently develop an experimental methodology for a physics experiment.
- receive critical feedback and use this to modify and improve the experimental methodology.
- write a scientific paper.
- understand ethical issues of research misconduct and bias, how they arise and their impact on scientific community.
- understand ethical issues such as inappropriate analysis methods/techniques, such as p-hacking, and the importance of falsifiability and replicability.
- understand ethical issues involved in diversity and inclusion in science.

Assessments

The weighted average of all components of this course, detailed below, will be used to determine each student's grade. However, if the application of this scheme would result in grades that are judged by the instructor to be inconsistent with the University's grading descriptions (<https://www.uvic.ca/calendar/undergrad/index.php#/policy/S1AAgoGuV>), then the instructor will assign percentages consistent with them. The instructor will review all marks prior to assigning a final grade.

Participation in in-class worked examples - 6%

Lectures include a number of examples. Students will receive participation marks for their effort in working through these examples. Students will submit their work by the end of the lecture for grading based solely on participation.

Lab 1 - 10%

Lab 2 - 12%

Lab 3 - 12%

Labs 1 through 3 consist of a shortened report, as outlined in the lab manual.

Lab 4 - 20%

Lab 4 consists of a report along with a prediction and test.

Lab 5 - 40%

Lab 5 grade includes the initial proposal and methodology for the experiment, a short presentation to peers, a response to the peer feedback, and the final, full lab report (paper) submission.

Academic Integrity

Students are expected to adhere to the academic integrity policy of the University of Victoria. Details on this policy can be found here: https://www.uvic.ca/calendar/undergrad/index.php#/policy/Sk_0xsM_V.

Course Materials:

- (Required) PHYS329 Lab Manual

Resources for Students

UVic Learn Anywhere - <https://onlineacademiccommunity.uvic.ca/LearnAnywhere/>

Many high schools do not adequately prepare students for how to succeed in university, in large part due to the large differences in expected workload. The UVic Learn Anywhere site can help students use their time more effectively and have better outcomes.

UVic Centre for Academic Communication - <https://www.uvic.ca/learningandteaching/cac/>
Struggling with homework that involves writing? English not your first language? The Centre for Academic Communication has supports available to help you.

UVic Math and Stats Centre - <https://www.uvic.ca/science/math-statistics/current-students/undergraduate/msac/index.php>

Struggle with math? No matter the course, the Math and Stats Centre can provide assistance. As long as the assistance is with the mathematics of the problem, there are people available to help.

Academic Accommodations - <https://www.uvic.ca/students/academics/academic-concessions-accommodations/index.php>

Have a disability that might be affecting your studies? The Centre for Accessible Learning can review your diagnosis and provide you with academic accommodations that help reduce the effects of the barriers to education you are experiencing as a result of interactions between course design and your disability.

Student Code of Conduct - <https://www.uvic.ca/services/studentlife/student-conduct/index.php>

Students are expected to behave with respect towards their environment and their community. When there are allegations of student misconduct, this is governed by the Office of Student Life.

Sexualized Violence - <https://www.uvic.ca/sexualizedviolence/>

If you have been the victim of sexualized violence, this link will help you know how to take the next steps for resolution.

UVic Policies & Statements

General Information for all Students - <https://www.uvic.ca/calendar/archives/202301/undergrad/index.php#/content/62daf5e98b7d47001d0fc38b>

This is a list of links to information that may be useful to you.

Academic Concession Policy - <https://www.uvic.ca/calendar/undergrad/index.php#/policy/HJjAxiG04>

This policy governs your rights and responsibilities in the case that you experience an unexpected and unavoidable circumstance (e.g. illness, injury, bereavement, etc), or have conflicting responsibilities (e.g. varsity sports event).

Policy on Respectful and Productive Environment - <https://www.uvic.ca/calendar/archives/202301/undergrad/index.php#/policy/HkQ0pzdAN>

This is a statement and policy about UVic's dedication to a respectful and productive learning environment. This includes human rights, equity and fairness, as well as discrimination and harassment policies.

Policy on Religious Observances - <https://www.uvic.ca/calendar/archives/202301/undergrad/index.php#/policy/r1q0gofdN>

This policy governs students' rights towards religious observances and how to manage your observances with your course responsibilities.

Policy on Non-Academic Misconduct - <https://www.uvic.ca/services/studentlife/student-conduct/non-academic-misconduct/index.php>

This policy governs students' rights and responsibilities with regard to non-academic behaviour. Students are expected to treat each other and staff/faculty with respect.

Statement on Equity, Diversity and Inclusion - <https://www.uvic.ca/vpacademic/about-contacts/equity-diversity-inclusion/index.php>

This is UVic's official statement on equity, diversity, inclusion and anti-racism.