University of Victoria

Department of Physics & Astronomy
University of Victoria
Fall Term 2025

COURSE OUTLINE

PHYS 229: Introduction to Experimental Physics, A01 (12787) Fall 2025

Lectures: (10-10:50am, Monday & Thursday)

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

COURSE DESCRIPTION

Physics 229 is a broad introduction to a broad subject: experimental physics. The material for this course will be split into two parts: **electronics** (about 2/3 of the course) and **data analysis** (about 1/3 of the course). As this is a course in experimental physics, a large portion of your work will be in the lab. This course should be thought more as a lab with a lecture supplement rather than a lecture with a lab supplement.

PREREQUISITES & COREQUISITES

Must have Math 101 AND either (Phys 110 & Phys 111) or (Phys 120 & Phys 130)

CONTACT INFORMATION

Instructor: Andrew MacRae
Email: macrae@uvic.ca
Office: Elliott 113
Office Hours: Thursdays 115pm-230pm or upon request

COURSE MATERIALS

There is no official textbook for this course but there is an official set of course notes available to you at no cost on Brightspace. The Lab manual is required and can be purchased at the UVic bookstore. The cost of your lab manual includes a soldering project that will be distributed to you in the lab.

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

- Construct a physical circuit on a breadboard from a schematic
- Debug/Troubleshoot malfunctioning electronic instrumentation

- Identify methods of measuring a physical parameter, using electronic instrumentations
- Correctly identify and report statistical and systematic uncertainties

EVALUATION

Laboratory Work	35%
Assignments	15%
Weekly Quizzes	5%
Midterm Exam	10%
Final Exam	35%

Note:

- *You must pass the lab component to pass the course.*
- *If you receive a higher grade on your final than on your midterm, the final exam will count for both (i.e. your midterm will be worth 0% and your final will be worth 45%)*

COURSE POLICIES

Late/Missed Assignments or Exams

There will be a 10% penalty for late assignments up to 4 days, after which the solutions will be posted and your work will not be graded.

Academic Integrity

UVic's Policy on Academic Integrity is found at uvic.ca/calendar/future/undergrad/index.php#/home. It is every student's responsibility to be aware of this policy, including policies on cheating, plagiarism, unauthorized use of an editor, multiple submission, and aiding others to cheat. If you have any questions or doubts, please talk to me. For more information, see uvic.ca/learningandteaching/cac.

Use of AI

We live in a world where powerful AI tools like large language models (LLMs) are widely available. Like many tools, they are a double-edged blade, i.e. they can either accelerate or hinder your learning. You are in this class to understand physics. Not to memorize facts or perform computations (although this is a part of understanding) but to really understand it in your gut so you see not only how it works, but why it must be this way. You are free to use LLMs to gather information but you must at all times understand what you have written and be able to justify it. If you rely on AI to produce answers you don't understand, you're undermining your own education (and this won't help on an exam!)

COURSE CALENDAR AND OUTLINE

UVic Important Dates: uvic.ca/calendar/dates/
Last day to add courses: September 19, 2025
Last day to drop a course without penalty of failure: October 31, 2025
Final Exam Period: December 6 – December 20 2025

University of Victoria

Department of Physics & Astronomy
University of Victoria
Fall Term 2025

	Date	Lec	Chapter	Topics	Assignments		Labs			
Week 1	Sep 4	1	1.1-1.4	Intro, what is elex? Fundamental qtys: q,E,i,V,P	Ass 1		Date	B01/B04	B03	Date
	Sep 8	2	1.5-1.8	resistance/Ohm, resistors, what is a circuit?			Sep 8	Intro		Sep 10
Week 2	Sep 11	3	2.2, 2.7,2.8	Kirchhoff's Laws, Resistor networks.			Sep 11	Lab 1a	Intro	Sep 12
	Sep 15	4	2.1, 2.5-2.6	Voltage divider, real sources, Thevenin and Norton	material cutoff		Sep 15	Lab 1b	Lab 1a	Sep 17
Week 3	Sep 18	5	2.8-2.10	Thevenin example, AC vs DC electronics	A1 Due Date	Ass 2	Sep 18	Lab 2a	Lab 1b	Sep 19
	Sep 22	6	3.1-3.10	sine waves, RMS power, capacitance & capacitors	solns posted!		Sep 22	Lab 2b	Lab 2a	Sep 24
Week 4	Sep 25	7	4.1, 4.3	RC circutis, Inductors, Reactance, cpx numbers			Sep 25	Lab 3a	Lab 2b	Sep 26
	Sep 29	8	4.1, 4.3	cpx impedance, Generalized Ohm's Law			Sep 29	Lab 3b	Lab 3a	Oct 1
Week 5	Oct 2	9	4.2, 4.4	Filters, Example, Frequency domain, Bode Plots	Ass 3	material cutoff	Oct 2	Lab 4a	Lab 3b	Oct 3
	Oct 6	10	3.11, 4.5	Diodes, Semiconductors, Real Diodes		A2 Due Date	Oct 6	Lab 4b	Lab 4a	Oct 8
Week 6	Oct 9	11	5.1, 5.3	Transistors, Amplification, Differential Amps	Practice Midterm	solns posted!	Oct 9	Lab 5a	Lab 4b	Oct 10
	Oct 13			Thanksgiving			Oct 13		Lab 5a	Oct 15
Week 7	Oct 16	12	6, 7.1	Opamps/Feedback, Golden Rules, voltage amps			Oct 16	Lab 5b	Lab 5b	Oct 17
	Oct 20	13	7.2	opamp applications: add&subt/calculus/compare	material cutoff		Oct 20	Lab 6a	Lab 6a	Oct 22
Week 8	Oct 23	MT		Midterm Exam		Ass 4	Oct 23	Lab 6b	Lab 6b	Oct 24
	Oct 27	14	8.1, 8.2, 5.x	Analog vs Digiat computation, binary nbr system			Oct 27	Lab 7a	Lab 7a	Oct 29
Week 9	Oct 30	15	8.3-8.4	Transistors pt II, Gates, Digital Adder	A3 Due Date		Oct 30	Lab 7b	Lab 7b	Oct 31
	Nov 3	16	8.5, 8.6	Memory: latches and flip flops	solns posted!		Nov 3	Lab 8a	Lab 8a	Nov 5
Week 10	Nov 6	17	Ch 9	ADC and DAC, Nyquist's Sampling Theorem	Ass 5	material cutoff	Nov 6	Lab 8a	Lab 8a	Nov 7
	Nov 10			Remembrance + Reading Break			Nov 10			Nov 12
Week 11	Nov 13	18	10.1	Intro to the Theory of Measurement		A4 Due Date	Nov 13			Nov 14
	Nov 17	19	10.2	Error Propagation, counting rule		solns posted!	Nov 17	Lab 9a	Lab 9a	Nov 19
Week 12	Nov 20	20	10.3	Statistics: variance, mean, systematics	material cutoff	Ass 6	Nov 20	Lab 9b	Lab 9b	Nov 21
	Nov 24	21	10.4	Distributions, histograms, Normal Function Math	A5 Due Date		Nov 24	Lab 10a	Lab 10a	Nov 26
Week 13	Nov 27	22	10.5, 10.6	Erf(x), significance, Chauvenet's Criteria	solns posted!		Nov 27	Lab 10b	Lab 10b	Nov 28
Week 14	Dec 1	23	10.7	Models and curve fitting		material cutoff	Dec 1			Dec 3
						A6 Due Date				

CHANGES DUE TO UNFORESEEN CIRCUMSTANCES

The above schedule, policies, procedures, and assignments in this course are subject to change in the event of extenuating circumstances. In the event of significant changes, a revised outline will be posted/circulated.

UVIC GRADING SYSTEM – UNDERGRADUATE

As per the Academic Calendar:

Grade	Grade Point Value	Grade Scale	Description
A+	9	90 – 100%	**Exceptional, outstanding** and **excellent** performance. Normally achieved by a minority of students. These grades indicate a student who is self-initiating, exceeds expectation and has an insightful grasp of the subject matter.
A	8	85 – 89%	
A-	7	80 – 84%	
B+	6	77 – 79%	**Very good, good** and **solid** performance. Normally achieved by the largest number of students. These grades indicate a good grasp of the subject matter or excellent grasp in one area balanced with satisfactory grasp in the other area.
B	5	73 – 76%	
B-	4	70 – 72%	

Grade	Grade Point Value	Grade Scale	Description
C+	3	65 – 69%	**Satisfactory**, or **minimally satisfactory**. These grades indicate a satisfactory performance and knowledge of the subject matter.
C	2	60 – 64%	
D	1	50 – 59%	**Marginal** Performance. A student receiving this grade demonstrated a superficial grasp of the subject matter.
F	0	0 – 49%	**Unsatisfactory** performance. Wrote final examination and completed course requirements; no supplemental.
N	0	0 – 49%	Did not write examination or complete course requirements by the end of term or session; no supplemental.

COURSE FEEDBACK

I value your feedback on this course. Towards the end of term, as in all other courses at UVic, you will have the opportunity to complete an anonymous **Course Evaluation Survey (CES)** regarding your learning experience. The survey is important for providing feedback to me regarding the course and my teaching, as well as to help the department improve the overall program for students in the future. The survey is accessed online and can be done on your laptop, tablet, or mobile device. I will remind you and provide you with more detailed information nearer the time, but please be thinking about this important activity during the course.

APPENDICES

DEPARTMENT OF PHYSICS AND ASTRONOMY INFORMATION

- **Department Website:** uvic.ca/science/physics/index.php
- **Department General Office:** physgen@uvic.ca
- **Department Undergraduate Advisor:** phast_advising@uvic.ca
- **Department Graduate Advisor:** pkovtun@uvic.ca
- **Department Graduate Program Assistant:** physgrad@uvic.ca

---

UNIVERSITY STATEMENTS & POLICIES

- Academic Calendar: Information for All Students
- Creating a respectful, inclusive, and productive learning environment
- Accommodation of Religious Observance
- Accommodation and Access for Students with Disabilities
- Student Conduct
- Non-academic Student Misconduct
- Accessibility
- Diversity / EDI
- Equity Statement
- Sexualized Violence Prevention and Response
- Discrimination and Harassment Policy

STUDENT RESOURCES

POSITIVITY AND SAFETY

The University of Victoria is committed to promoting, providing, and protecting a positive and safe learning and working environment for all its members.

Student Groups & Resources

ACADEMIC RESOURCES

UVic Library - *UVic Library offers many services and resources for undergraduate and graduate students*.

uvic.ca/students/academics/library-services

Learning Resources - *UVic Learn Anywhere is the primary learning resource for students that offers many learning workshops and resources to help students with academics and learning strategies.*

onlineacademiccommunity.uvic.ca/uviclearn/

Centre for Academic Communication - *Offers online and in-person one-on-one tutorials, workshops, and more.*

uvic.ca/learningandteaching/cac

Math & Stats Assistance Centre - *Offers drop-in, face-to-face tutoring and a friendly, collaborative study space for 100- and 200-level math and stats courses.*

uvic.ca/science/math-statistics/current-students/undergraduate/msac

MENTAL HEALTH & WELLNESS

A note to remind you to take care of yourself. Do your best to maintain a healthy lifestyle this semester by eating well, exercising, getting enough sleep, and taking some time to relax. This will help you achieve your goals and cope with stress. All of us benefit from support during times of struggle. You are not alone.

Student Wellness Centre - *Our team of practitioners offers a variety of services to support students' mental, physical, and spiritual health.*

uvic.ca/student-wellness

Counselling Services - *Counselling Services can help you make the most of your university experience. They offer free professional, confidential, inclusive support to currently registered UVic students.*

uvic.ca/student-wellness

Health Services - *University Health Services (UHS) provides a full-service primary health clinic for students and coordinates healthy student and campus initiatives.*

uvic.ca/student-wellness

ACCESSIBILITY

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a documented disability or health consideration that may require accommodations, please feel free to approach me and/or the Centre for Accessible Learning (CAL) as soon as possible.

Centre for Accessible Learning - *The CAL staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations. The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.*

uvic.ca/accessible-learning

ADVISING

For academic advising-related questions, students in the School of Earth and Ocean Sciences are also encouraged to meet with the SEOS Undergraduate Advisor (seosadvisor@uvic.ca) as well as an academic advisor in the Academic Advising Centre early in their studies to help map out a plan to declare a major and complete university program requirements.

Academic Advising Centre - *Academic advice and support is currently available by phone, email and virtual or in-person appointments*. uvic.ca/services/advising

Ombudsperson - *The ombuds office is an independent, impartial, and confidential resource for undergraduate and graduate students and other members of the University of Victoria community. The ombudsperson helps resolve student problems or disputes fairly.* uvicombudsperson.ca

ACADEMIC CONCESSION

You can request an academic concession if your course requirements are affected by unexpected and unavoidable circumstances, or conflicting responsibilities. Concession requests can be for an in-course extension, deferral, withdrawal under extenuating circumstances, or an aegrotat. Please speak to an advisor at the Academic Advising Centre if you have questions on how requesting a concession will affect your academic program.

Undergraduate Academic Concessions - uvic.ca/students/academics/academic-concessions-accommodations

EQUITY AND HUMAN RIGHTS AT UVIC

EQHR is a resource for students, staff, and faculty who have experienced sexualized violence, discrimination, and/or harassment and are looking for informal and/or formal resolution options as well as advice, coaching, and/or education. We are available for confidential consultations so that you can ask questions and learn your options.

EQHR – By email at eqhr01@uvic.ca or in-person (Sedgewick C115). uvic.ca/equity

Sexualized Violence Resource Office – *If you have been directly or indirectly impacted by sexualized violence, reach out to the SVRO for information, advice, and resolution options (restorative and disciplinary) as well as support options and referrals. The SVRO is both survivor-centred and trauma-informed in their approach. You can reach us by phone at 250-721-8021 or by email at eqhr01@uvic.ca to book either an in-person (Sedgewick C119) or online appointment.* uvic.ca/sexualizedviolence

RESOURCES FOR INTERNATIONAL STUDENTS

International Centre for Students - *The primary office supporting international students on campus at the university-wide level*. uvic.ca/international-experiences

UVic Global Community Initiative - *Provides various supportive programming, including a Mentorship Program and Conversation Partner Program*. uvic.ca/international-experiences/get-involved/uvic-global-community

RESOURCES FOR INDIGENOUS STUDENTS

Indigenous Student Support - *UVic offers holistic services to Indigenous students throughout their academic journey.* uvic.ca/students/info-for/indigenous-students

Elders in Residence - *The Office of Indigenous Academic and Community Engagement (IACE) has the privilege of assembling a group of Elders from local communities to guide students, staff, faculty, and administration in Indigenous ways of knowing and being.* uvic.ca/iace/