PHYS 110 – Introductory Physics I
Course Outline: Jan 2026 – Apr 2026

Instructors: Dr M Laidlaw laidlaw@uvic.ca (coordinator)
Please email me directly rather than using any LMS messaging function.
Include PHYS 110 in the email subject and tell us your student number.

Lectures: A01 & A02 TWF 11:30-12:20
A03 Online Asynchronous
The in-person sections may be taught using a "flipped" modality. Previously recorded lecture videos will be available to all students; you are expected to watch them. The in-person sessions will be an opportunity for the instructor to elaborate on the theory, applications, demonstrations, and examples as they consider appropriate.

Labs: In-person lab sessions will be held starting on Jan 12.
You must attend your lab section; there is marked work starting Jan 12.
All students will complete their labs in person.

Prerequisite: MATH 100, 109, or 102 (MATH 102 is not recommended)
To register in this class, you must have credit for or be concurrently registered at UVic in a calculus class (MATH 100, 102, or 109).
We expect that you have mastered equivalent material to BC Physics 12.

Required Texts:
A textbook, lab manual, and other course resources by Dr Keeler, Dr Laidlaw, and Dr Martin will be available electronically.
To access these resources and the assignments you must purchase the text.
The purchase is done through the bookstore, and can be done online.

Other Required Supplies:
You need to ensure you have a computer, a working webcam, and a stable internet connection that can support applications such as Zoom or playing online videos.

Electronics Policy for Exams:
The only permitted calculator for any exam is a Sharp EL-510 series non-programmable, non-graphing calculator.
Cellphones, tablets, and computers are not permitted in exams. Internet-connectable personal electronics including smart watches, headphones, smart glasses, or any similar devices are not permitted. Technologies that conflict with this policy but are used for the purpose of academic accommodations will be overseen by the CAL assessment program.

Calendar Description: Newton's laws; particle dynamics and curvilinear motion; force and momentum; kinetic and potential energy; circular and rotational motion; gravitational and electric forces.

Course Learning Goals:
Upon completing this course you will be able to:

- Represent and manipulate three-dimensional vectors using algebraic methods.
- Construct and analyze free-body diagrams to determine conditions for translational & rotational equilibrium, and apply Newton's Laws to solve for unknown quantities.
- Apply calculus methods to vector-valued functions to relate position, velocity and acceleration.
- Apply Newton's Second Law for translational and rotational motion to relate net force and net torque to acceleration.
- Calculate gravitational, electric and Lorentz forces in terms of relative vector properties in three dimensions.
- Use physical principles to identify and incorporate normal forces, frictional, spring and tension forces as appropriate.
- Use relationships of momentum, angular momentum, work and energy to analyze and solve mechanical systems.
- Identify cases where kinematic quantities are conserved and use these principles to solve physical problems.
- Apply Kirchoff's Laws to analyze and solve direct-current circuit problems.
- Decompose physics problems provided in textual and/or visual forms, identify relevant physical principles, and implement problem solving strategies to determine unknown quantities.
- Express measurements and derived quantities with appropriate uncertainties, and use those uncertainties to perform simple hypothesis tests.
- Construct appropriate graphical representations of experimental data using standard software, perform linearization where applicable, and determine slopes, intercepts, and associated uncertainties.
- Interpret laboratory results using appropriate physical principles, including explaining agreement or discrepancy with theoretical predictions.

Modality and Assessment Design:

The modality of instruction in this course is primarily face-to-face apart from section A04 which is online with some face-to-face.
There are some course elements that can only be completed in-person:
(1) the labs, (2) the midterm assessments, and (3) the final exam.

This course's evaluation is structured through the lens of "universal design". The instructors have assessed the essential learning goals of the course and made a determination about how and where flexibility can be offered and articulated it clearly for everybody. The provisions (detailed below) which allows some omission or substitution of work are intended as a full and reasonable accommodation for issues such as illness, conflict of commitment, unexpected adverse circumstances, or episodic productivity issues. They are intended and will be used as a "first resort" for all cases, and in nearly all cases will be all the provision necessary.

The following provisions apply to all students:

- If you miss a single midterm for any reason its weight will be transferred to the final exam.
- If you write both midterms the lower score of the two can be replace by a higher score on the final exam.
- If you miss both midterms you will be given the opportunity to write an exam to replace one midterm near the end of the term. The other will be replaced by the final.
- Your lab score will be based on the best 5 (of 6) lab submissions.
- If you miss two or three labs because of illness or conflict of commitment you will be offered a single makeup lab at the end of the term.
- Up to three assignment marks can be replaced by the mark on the corresponding "teaching assignment", and after that replacement has been done your assignment score will be based on the best 10 (of 11) assignment submissions.

If you anticipate missing an in-person course element because of illness or conflict of commitment you must email the instructors promptly so we can record the information.

If there is an unexpected and major change of circumstances the instructors will modify the course requirements in the same spirit as the original course structure and communicate any changes clearly and promptly. In particular, all exams are anticipated to be in person unless it is impossible to do so.

We ask that you not attend any in-person course component if you are ill; students exhibiting any cold or flu-like symptoms may be asked to leave.

Grading

While we do not grade on a curve, in the past, courses like this have typically had roughly the following grade distribution:

A-range: 20%; B-range: 40%; C/D-range: 30%; F: 10%

The essential elements of the course are: (1) the final exam, and (2) submission of a minimum of 4 labs. Students who complete both of these are considered to have made a complete attempt at the course and will be assigned a final letter grade.
There will be four evaluated components, these are described below.

Final Exam:

The final exam will be worth 50% or 60% depending on the weighting of the midterms.

There will be an in-person final exam during the April exam period for all students. This exam will be similar in format to the midterms, and it will be comprehensive. The final exam is a required course element; students who do not write the final exam will be assigned the grade "0% N" unless they are otherwise debarred from writing the final exam.

A deferred exam to accommodate students who are ill or have other issues is tentatively scheduled for Monday May 4.

To be eligible to pass the course students must have minimally acceptable performance on the final exam ("must pass"), and to be eligible to attain a C or above students must have adequate performance on the final exam. The instructors will use their judgement to determine what constitutes both minimally acceptable and adequate performance. The threshold to "pass" the exam will be at most 40%, and the threshold for "adequate performance" will be at most 50%. Since the deferred exam will be different from the regular exam its thresholds may be different.

Midterms:

The midterms will be worth 20% or 10% as described below:

There will be two midterms on Sat Feb 7 and Sat Mar 14. Both midterms will run from 10:00am with a benchmark length of 90 minutes. Their locations will be announced. Each will be worth 10%. One midterm score will be replaced by the final exam score if that results in a higher overall score. This means that if you miss one midterm because of illness it is replaced by the final exam. If you miss a midterm because of illness you will need to contact us promptly.

Exceptional Cases: Students who do not write either midterms will write a midterm worth 10% on Apr 2 at 10:00am.

Assignments:

The assignments are worth 10% as described below:

Regular weekly assignments: Roughly every week an assignment will come available. It will normally be due on the following Friday. These assignments follow exactly the pace of the course. We anticipate most students will be able to complete them in 3-4 hours. The best 10 of 11 assignments will be averaged to form your assignment mark; up to three assignments may be replaced by the corresponding "Teaching Assignments"

Teaching Assignments: Roughly every week a "teaching assignment" will come available. All teaching assignments will be due on April 3. They take a variable amount of time to do, but are structured to assist your studying. They may replace up to 3 assignments in the calculation of your assignment mark. This means that you have the opportunity to make up a assignment that you miss because of illness, conflict of commitment, or other issue.

All assignments will be administered through the Webwork system.
The purpose of the assignments is to encourage and assess your continuing engagement with the course material. Since this continuing engagement is an essential process in the course, and as there are some alternatives in the grading scheme, we will not consider modifications of the due dates.
Students who work on the assignments regularly and use them as a tool to identify and practice the processes we teach in this course are, in our experience, much more likely to do well in the course.

Labs:

The labs are worth 20% as described below:

You will be responsible for 6 lab submissions. Your grade in the labs will be based on the best 5 of 6 lab submissions. Submission of a minimum of 4 labs is a required course element. Students who do not attend and submit at least 4 labs will be assigned the grade "0% N" and debarred from writing the final exam. Only labs submitted through Brightspace prior to the deadline and in the proper format will be marked.

Your labs start with an introductory session in the period Jan 12 – Jan 16. At this session you will get instructions about your future lab schedule, further information about the expectations for the labs, and you will perform a simple exercise.

For the remainder of the labs you will undertake the in-person lab activities in pairs and take data during the lab period. You will submit your lab work on the BrightSpace website. To be eligible for marking you must attend the lab session, include documentation of your data, and be substantially distinct from the work of other students. You may not submit the same work as your lab partner. You may not submit work you or another person has done in a previous term. Submitting

the same work as another student is addressed by the grading criteria to provide an education opportunity about academic integrity, however incidents may also be addressed under the academic integrity policy.

If you are ill at the time of an in-person lab you may not attend. Your lab instructors may refuse entry to any student who appears to be sick. It is your responsibility to contact the course instructors promptly if you miss a lab because of illness, conflict of commitment, or unexpected significant circumstances; if you do not contact us we will presume you missed for another reason.

- If you do not attend one lab because of illness you are accommodated by the grade being calculated omitting one of the labs.
- If you do not attend two or more labs because of illness you may be offered the opportunity to make up <u>one</u> lab in-person on Apr 2, 3, or 4. The instructors will contact you about this by Mar 31.
- If you miss three or more labs because of illness it will not be possible to fully accommodate you. You may be eligible to apply to withdraw from the course as long-duration illness has prevented you from fully participating.

If you fall ill or for any reason are unable to fully complete an individual lab writeup you are expected to submit what you have completed because you had time available during the lab to work on it; our provision of makeup opportunities is for students who cannot attend the lab session because of illness.

Lab exemptions: Some students are eligible to apply for exemption from the lab portion of the course. The eligibility requirements are:

- Have a recorded final grade in the course from Sept 2020 or later.
- Submitted all, or all but one, of the labs in that attempt.
- Was assigned an average score of 70% or higher on the labs.
- Registration in lab B10.

Applications for lab exemption are due by Jan 13.
If you apply and are eligible you will be registered in B10 and given a lab test to complete in person on Jan 15. Your score on this will form your lab grade. If after completing the lab test you elect to register in a regular lab and complete the rest of the labs this test will replace your grade for lab 1.

<u>It is a University regulation that to pass the course you must pass the labs. Any student with unsatisfactory standing in the labs will not be able to write the final exam and will be assigned the grade "0% F".</u>

Academic Integrity

The instructors take Academic Integrity in this course extremely seriously.
You can find UVic's Policy on Academic Integrity in the Calendar; here is a link.

In overview, your responsibilities are:

- For the final exam you must complete all work on your own without help from another person or from outside sources.
- For the midterms you must complete all work on your own without help from another person or from outside sources.
- For the labs you must submit your own original work. You may seek help or advice from an instructor or another student. You may not copy or paraphrase from another student. You may not permit your work to be copied or paraphrased by another student.
- For the assignments you must undertake the work yourself. You may seek advice or help from an instructor, other students, a tutor, or other person, but you are responsible for understanding and undertaking the work you submitted.
- Note that it is an academic integrity violation and a violation of UVic policies about information technology to post material from this class to any online "homework help" site.

The instructors are taking several active and passive measures to monitor the course to maintain the integrity of the course.

In the unlikely event that an exam must take place online it will be remotely supervised. You will be required to log in to Zoom through your UVic account and turn on your webcam showing yourself and the area surrounding you as you work. If you do not participate in the remote proctoring your grade for that course element will be set to 0.

The online assignments (and exams if applicable) will require you to provide numerical answers to questions. The questions will be marked based on whether the numerical answer is close to the correct numerical answer. The numbers in the questions you must answer will be randomized. If an exam must be held online you will be required to submit your rough work. In assessing this work, instructors may require a student to support answers submitted. Examples of the kind of support that may be required include written solutions leading to the submitted answer, or the requirement to verbally explain the reasoning to the same, or substantially similar, problems.

If the instructors have a reasonable apprehension that an academic integrity violation has occurred they will forward it to their Chair as outlined in the Policy on Academic Integrity.

Studies being done on this course

#1 - Assignments

Assignment completion rates and behaviour in this course will be the subject of a study conducted by Mark Laidlaw and Richard Keeler. The purpose of this research is to

- Measure the percentage of students who complete the assigned homework
- Quantify the relationship between homework completion habits and assigned final grades.
- Assess the viability of different methods of automated assessment

The data collected include your score on individual assignments and the times at which you accessed and answered individual assignment items.

The anticipated benefit is to demonstrate whether assignments can be administered through UVic's CourseSpaces system, and to identify assignment completion habits correlated with success so they can be taught to future class sections. The data used in the study will be anonymous. The use of your data will not affect your mark in any way; no analysis will be done before grades are finalized.

Your data will be processed as follows: Using the student number, final grades will be associated with scores on each assignment and the times the assignment items were accessed. All identifying features such as student number are then removed from the data.

If you have questions about the methods and goals of the research, about how your data will be used, or about the use of your data, please contact Mark Laidlaw by email at laidlaw@uvic.ca. You may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Human Research Ethics Office at the University of Victoria (250-472-4545 or ethics@uvic.ca).

#2 – Exams

Exam results in this course will be the subject of a study conducted by Mark Laidlaw. The object of the study is to characterize the difficulty of exam questions. The anticipated benefits of the study are to help standardize course grades from year to year, and to improve question design. The data used in the study will be anonymous and will be statistical in nature (for example: 53% of students who got a "B" answered question 20 correctly). The use of your exam data will not affect your mark in any way, as no analysis will be done before grades are finalized. You will receive a follow-up email with more details after the completion of the course. If you have questions about the methods and goals of the research, or about how your data will be used, please contact Mark Laidlaw by email at laidlaw@uvic.ca.

You may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Human Research Ethics Office at the University of Victoria (250-472-4545 or ethics@uvic.ca).

#3 – Exam Completion Times

Exam completion times and grading outcomes of this course are the subject of a study being conducted by Dr. Mark Laidlaw and Dr. Travis Martin. The purpose of this research is to characterize student exam submission behaviours, and examine how they correlate with student performance. One of the factors that will be tested includes the maximum duration assigned, which may imply status as a student with extended time accommodations. The anticipated benefit of this is to provide guidance data for academic administrators in determining policies on universal design.*

The data on completion times and durations will be kept separate from performance data until after the course has ended and final grades have been submitted. Furthermore, the analysis of the exam completion times and grades for students in this course will be performed using anonymized data, free of student names and student ID numbers, after the completion of the course and submission of final grades. The use of the data, and any collected timing data, will not affect your grade in any way.

Students may opt out of having their data analyzed for this study by sending an email to Dr. Mark Laidlaw or Dr. Travis Martin. Opting out of the analysis will in no way affect performance in the course.

If you have any questions about how your data will be used, or details about the study, you may contact the Data Steward, Dr. B.C. Choi, (phastchair@uvic.ca), or you may contact the researchers, Dr. Travis Martin (travismartin@uvic.ca) and Dr. Mark Laidlaw (laidlaw@uvic.ca). You may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Human Research Ethics Office at the University of Victoria (250-472-4545 or ethics@uvic.ca).

*Note: Universal Design is a modern pedagogical approach to address accessibility in courses. The approach argues that courses should be designed such that the environment and course policies should be equally usable by all people, regardless of ability or disability, as much as possible. There are many approaches for implementing Universal Design in courses, and these methods vary across disciplines.

Lectures and Assignments	Videos Available (Start – End)	Assignment due
Vectors #1	Jan 5– Jan 19	Jan 16
Translational Equilibrium #2	Jan 12 – Jan 26	Jan 23
Rotational Equilibrium #3	Jan 19 – Feb 2	Jan 30
Velocity and Acceleration #4	Jan 26 – Feb 9	Feb 6
Second Law #5	Feb 2 – Feb 23	Feb 13
Fundamental Forces #6	Feb 9 – Mar 2	Feb 27
Momentum #7	Feb 23 – Mar 9	Mar 6
Angular Momentum #8	Mar 2 – Mar 16	Mar 13
Work and Energy #9	Mar 9 – Mar 23	Mar 20
Conservation #10	Mar 16 – Mar 30	Mar 27
DC circuits #11	Mar 23 – Apr 6	Apr 3

Please note that the lecture videos and associated material will cease to be available on the dates described above. We limit the video availability because we have found that this results in better performance because it forces you to study throughout the course. You are expected to watch the videos and take notes as part of your ongoing engagement with the course. Your course notes and the text materials will be your primary sources for review material.

In Person Labs	Dates	Report due	Dates	Report due
Lab 1 Measurement	Jan 12 – Jan 16	Jan 22	Jan 12 – Jan 16	Jan 22
Lab 2 Comparisons	Jan 19 – Jan 23	Jan 29	Jan 26 – Jan 30	Feb 5
Lab 3 Quality Control	Feb 2 – Feb 6	Feb 12	Feb 9 – Feb 13	Feb 26
Lab 4 Graphical Analysis	Feb 23 – Feb 27	Mar 5	Mar 2 – Mar 6	Mar 12
Lab 5 Inertia Moment	Mar 9 – Mar 13	Mar 19	Mar 16 – Mar 20	Mar 26
Lab 6 Histograms	Mar 23– Mar 27	Apr 2	Mar 23 – Mar 27	Apr 2

If necessary lab order may be modified due to equipment availability.

Midterm 1: Feb 7 Vectors, Translational Equilibrium, Rotational Equilibrium, Velocity and Acceleration.
Midterm 2: Mar 14 Second Law, Fundamental Forces, Momentum, Angular Momentum
Midterm 3: Apr 2 Work and Energy, Conservation, DC circuits.
Midterm 3 is only offered to students who miss both Midterms 1 and 2.

Any concerns about grading must be brought forward promptly: normally concerns brought later than 7 days after the release of the grade will not be entertained.