Physics 1501A

Enriched Introductory Physics I
Fall 2025

Calendar description: A calculus-based laboratory course for students intending to pursue further studies in science, particularly the physical sciences. Newton's laws, energy, linear momentum, rotations and angular momentum, gravitation and planetary motion.
Antirequisite(s): Physics 1021, 1028A/B, 1301A/B, 1401A/B, the former Physics 1020, 1024, 1026.
Prerequisite(s): Grade 12U Physics (SPH4U); Grade 12U Calculus and Vectors (MCV4U) or Mathematics 0110A/B.
Corequisite(s): Calculus 1000A/B or 1100A/B or 1500A/B or Applied Mathematics 1413.
Extra Information: 3 lecture hours, 3 laboratory/tutorial hours, 0.5 course.

Note: This course, together with Physics 1502A/B, is a suitable prerequisite for all modules in the Faculty of Science, for all modules offered by the basic medical science departments and for professional schools having a Physics requirement.

Unless you have either the requisites for this course or written special permission from your Dean's Designate (Department/Program Counsellors and Science Academic Advisors) to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

Instructor:
Prof. Martin Houde

You can reach me via e-mail at mhoude2@uwo.ca. When contacting me by e-mail, please use your UWO e-mail account. Other accounts (such as hotmail and yahoo) are often tagged as spam and may not reach me.

Office Hours: My usual office hours will be announced on the OWL website. You are welcome to drop by at the posted times. If held online, the zoom meeting will have a waiting room so you will not immediately connect if someone is already in the zoom meeting with me, but you will be admitted as soon as possible. If the usual office hours are not convenient, you can also send me e-mail if you would like to arrange an alternate meeting time.

Teaching Assistants: The TAs for this course, their contact info and their office hours will be posted on the course OWL web site.

Course Syllabus, Schedule, Delivery Mode:

Course Outline (Numbers in parentheses refer to chapters in the OpenStax textbook.)

1. Newton's Laws (Ch. 5–6)
2. Conservation of Energy (Ch. 7–8)
3. Conservation of Linear Momentum (Ch. 9)
4. Conservation of Angular Momentum; Rotational Motion (Ch. 10-11)
5. The Gravitational Interaction, with astrophysical applications (Ch. 13)
6. Fluid Mechanics (Ch. 14)
7. *The Principle of Least Action (if time permits)*

Course-level learning outcomes:

The aim of this course is not only to gain a thorough understanding of the physics topics covered in class, but also to learn how to *think like a physicist* when describing phenomena or solving problems. Thus, by the end of this course, students should be able to:

- use a step-by-step problem-solving strategy underpinned with conceptual understanding to logically work through complex problems.
- reason through conceptual physics problems using clear, concise writing and diagrams.
- use knowledge and/or intuition to evaluate whether the answer to a problem makes sense.
- develop physics thinking skills and problem-solving approaches that are useful in a wide variety of different fields
- extend and apply Newton's Laws of Motion and conservation laws.
- perform appropriate experimental set-up, data collection and analysis to investigate a physical relationship.
- apply research skills such as measurement taking, uncertainty propagation, graphical analysis, and written discussion of results in the lab.
- engage in critical analysis of a problem individually and through team effort, effectively communicating your approach to others, through laboratory projects or other activities
- acquire an intuitive understanding of fundamental physics concepts
- learn calculus-based techniques in some approaches.
- develop physics thinking skills and problem-solving approaches that are useful in other fields and in everyday situations.

Format: This course will take place primarily in person; however, it may transition to an online format if required. I use chalk and a blackboard in class but my lecture notes will be posted prior to each class on OWL Brightspace (http://westernu.brightspace.com).

Tutorials: Physics 1501A has tutorials hosted by the course's Teaching Assistants. They usually occur in the weeks between labs. You should bring a laptop to the tutorials if you can, but you can also work with a classmate on their computer. The tutorials will be held on Monday afternoons about every second week. The tutorials are expected to take place in-person but may instead take place via zoom, should conditions require it. In tutorials, after some introductory material from the instructor or TAs, students will then break up into small groups to work on the tutorial worksheets together in real-time. You are expected to attend tutorials.

Laboratories: *In order to pass the course, you must pass the laboratory component!*
A laboratory orientation lecture will be posted on the OWL site by the first week of September. You must visit the course OWL site and familiarize yourself with the contents of this lecture before attending your first lab session. Labs are expected to be done in-person (except for the first Measurement lab, see more below) at this time but could transition to an online format.

The Physics 1501A laboratory timetable will be posted on the course OWL site. You must find your correct lab section, lab subsection, and the correct laboratory timetable before attending the first lab. Please attend the correct lab class on the correct date, as we do not give permission to attend lab classes outside your laboratory schedule. If you have difficulty following the timetable scheduled for your lab sub-section, please contact the laboratory coordinator at physlab1@uwo.ca.

There are four labs to be completed. The first lab on Measurement, is to be done entirely online through the OWL website. There are also three in-person labs. These are tentatively scheduled for Sep. 15, Oct. 6 and Oct. 27. The due dates are usually one week later via online submission through Gradescope.

Course Materials

Course Content: As previously stated, my lecture notes will be made available (in PDF form) prior to each class on OWL Brightspace. These notes are comprehensive and are the primary material to study from in the course. However, you can also access the University Physics (Volume 1 contains the material covered in the course) textbook from OpenStax for free online at https://openstax.org/details/books/university-physics-volume-1 for consultation and study, if desired.

Lab Manual: Physics Laboratory Manual 2025 for Physics 1501A. This Lab Manual will be available for purchase on *Perusall*, or from the Western Bookstore. You are required to purchase the first-semester lab manual for the course (go to https://bookstore.uwo.ca/textbook-search?campus=UWO&term=W2025A&courses[0]=001_UW/PHY1501A). Please contact the course

JIRA https://help.sci.uwo.ca/servicedesk/customer/portal/8 if you have any difficulties obtaining this lab manual.

OWL: Students are responsible for checking the course OWL Brightspace (http://westernu.brightspace.com) site on a regular basis for news and updates. The site will contain all lecture content and important course material. This will also contain this link to *Perusall* for the laboratory manual. This is the primary method by which information will be disseminated to all students in the class. If students need assistance with OWL, they can seek support on the OWL Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

Gradescope: Lab write-ups in the course will be submitted via the gradescope.ca website. Gradescope should be accessed directly from the OWL course website (see link on the left side in the appropriate week), not by navigating to gradescope.ca. Gradescope will accept scans, annotated PDFs or photos of handwritten assignment pages. These will be accessed by the TAs to grade, and marks and feedback will be returned to the student via Gradescope.

Methods of Evaluation

Assignments: You will receive lists of suggested problems during the semester. At times, I will require that you turn in specific problems as assignments; there will probably be three such assignments during the semester. Students will be allowed to discuss the material among themselves, but each student will have to turn in her/his own copy of the assignment. Assignments must be turned in at the requested date and submission will be done online through Gradescope. Submissions must be done before or during the 48 hour no-late-penalty window. Assignments submitted after this window will be given a grade of 0%, as full solutions are posted at the end of the assignment submission window.

Term Tests: There will be two in-class term tests, each lasting 50 minutes. The midterms are expected to happen on the following dates: Wednesday, Oct. 22 2025; and Wednesday Nov. 12 2025 but are subject to change: any changes will be announced in class. These are cumulative and could test material on topics covered at any earlier point in the course. Bring a calculator but no notes or books will be allowed; a formula sheet may be allowed or supplied. The tests will include problems to be worked out. This means that you must start from fundamental principles to develop the formulae that describe the mathematical model of the physical situation, explaining your reasoning as you go.

There will be no makeup Midterm Exams in this course. If you receive permission from academic counselling to miss a midterm, this 20% (see Grading below) will be split evenly over the other midterm and Final Exam. If you receive permission from academic counselling to miss both midterms, then the entire 40% midterm grade will be added to the Final Exam.

Final Exam: Three hours long, covers material of the entire course and will be worth 35% of the course final grade. Bring a calculator; a formula sheet may be allowed or supplied with the exam. Date, time, and location are to be announced. The Final Exam must be taken: there will be one makeup Final Exam.

Electronic Devices: No electronic devices except standard scientific calculators will be allowed during tests and examinations. Calculators may be of any standard scientific type but may not be wireless-capable.

Grading:
Assignments 15%
Laboratories 10% (Note: In order to pass the course, you must pass the laboratory component.)
Term Tests (20+20) 40%
Final Exam 35%

Please note: The Department of Physics and Astronomy may, in rare cases, adjust the final course marks in order to conform to Departmental policy.

Tutorial / Laboratory / Exam Schedule

Week of	
Sept. 1	Laboratory – Measurements Lab
Sept. 8	No lab or tutorial
Sept. 15	Laboratory – Position, Velocity & Acceleration
Sept. 22	Tutorial
Sept. 29	No tutorial
Oct 6	Laboratory – Work and Energy
Oct. 13	No tutorial (Thanksgiving)
Oct. 20	Tutorial – **Term Test 1 on Wed Oct 22**
Oct. 27	Laboratory – 1-D Collisions
Nov. 3	No lab or tutorial – *Fall Reading week*
Nov. 10	Tutorial– **Term Test 2 on Wed Nov 12**
Nov. 17	No tutorial
Nov. 24	Tutorial
Dec. 1	Tutorial

Student Absences

If you are unable to meet a course requirement due to illness or other serious circumstances, please follow the procedures below.

Assessments worth less than 10% of the overall course grade:

- **Assignments*:*** no accommodations or make-up.
- **Absence from a Lab:** a missed lab will be assigned a mark of zero unless you have been granted academic consideration through an academic counsellor at the Dean's office of your home faculty. Students with approved academic consideration should contact the lab team via JIRA (https://help.sci.uwo.ca/servicedesk/customer/portal/8) with the subject line "Missed lab <lab name> - requesting accommodation" to arrange the make up for a missed lab, which may be online.

Assessments worth 10% or more of the overall course grade:

For assessments totalling 10% or more of the final course grade, you must provide valid medical or supporting documentation to the Academic Counselling Office of your Faculty of Registration as soon as possible.

General information about missed coursework
Students must familiarize themselves with the *University Policy on Academic Consideration – Undergraduate Students in First Entry Programs* posted on the Academic Calendar: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf,

This policy does not apply to requests for Academic Consideration submitted for **attempted or completed work**, whether online or in person.

The policy also does not apply to students experiencing longer-term impacts on their academic responsibilities. These students should consult Accessible Education.

For procedures on how to submit Academic Consideration requests, please see the information posted on the Office of the Registrar's webpage:
https://registrar.uwo.ca/academics/academic_considerations/
All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline.

All Academic Consideration requests must include supporting documentation; however, recognizing that formal documentation may not be available in some extenuating circumstances, the policy allows students to make one Academic Consideration request **without supporting**

documentation in this course. However, the labs, midterms and the final exam are excluded from this, and therefore always require formal supporting documentation.

Absences from Final Examinations

If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you can do so. They will assess your eligibility to write the Special Examination (the name given by the University to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (e.g., more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period).

If a student fails to write a scheduled Special Examination, the date of the next Special Examination (if granted) normally will be the scheduled date for the final exam the next time this course is offered. The maximum course load for that term will be reduced by the credit of the course(s) for which the final examination has been deferred. See the Academic Calendar for details (under Special Examination).

Note: missed work can *only* be excused through one of the mechanisms above. Being asked not to attend an in-person course requirement due to potential COVID-19 symptoms is **not** sufficient on its own.

Accommodation and Accessibility

Religious Accommodation
When conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request an accommodation for their absence in writing to the course instructor and/or the Academic Advising office of their Faculty of Registration. This notice should be made as early as possible but not later than two weeks prior to the writing or the examination (or one week prior to the writing of the test).

Please visit the Diversity Calendars posted on our university's EDID website for the recognized religious holidays:

https://www.edi.uwo.ca.

Accommodation Policies
Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic Accommodation_disabilities.pdf.

Academic Policies

The website for Registrar Services is https://www.registrar.uwo.ca/.

In accordance with policy,

https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf,

the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at their official university address is attended to in a timely manner.

Technology Only calculators are allowed on exams: basic calculators only (non-programmable). Any "smart" devices with ethernet connectivity are not allowed.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Computer-marked multiple-choice tests and exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

Remote Proctoring Software may be used in this course, including in the event of health lock-down. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide **personal information** (including some biometric data) and the session will be **recorded**. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at:

https://remoteproctoring.uwo.ca.

Support Services

Please visit the Western Engineering Academic Counselling webpage for information on add/drop courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: https://www.eng.uwo.ca/undergraduate/academic-support-and-accommodations/academic-counselling.html

Students who are in emotional/mental distress should refer to Mental Health@Western (https://uwo.ca/health/) for a complete list of options about how to obtain help.

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Accessible Education at

http://academicsupport.uwo.ca/accessible_education/index.html

if you have any questions regarding accommodations.

Learning-skills counsellors at Learning Development and Success (https://learning.uwo.ca) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: https://www.uwo.ca/se/digital/.

Additional student-run support services are offered by the USC, https://westernusc.ca/services/.

This course is supported by the Science Student Donation Fund. If you are a student registered in the Faculty of Science or Schulich School of Medicine and Dentistry, you pay the Science Student Donation Fee. This fee contributes to the Science Student Donation Fund, which is administered by the Science Students' Council (SSC). One or more grants from the Fund have allowed for the purchase of equipment integral to teaching this course. You may opt out of the Fee by the end of September of each academic year by completing the online form linked from the Faculty of Science's Academic Advising site. For further information on the process of awarding grants from the Fund or how these grants have benefitted undergraduate education in this course, consult the Chair of the Department or email the Science Students' Council at ssc@uwo.ca.