

PHYSICS 1502 – ENRICHED INTRODUCTORY PHYSICS II

COURSE OUTLINE

Land Acknowledgement

*We acknowledge that
Western University is situated on the traditional lands of the
Anishinaabeg, Haudenosaunee, Lūnaapéewak and Chonnonton nations,
on lands connected with the London Township and Sombra Treaties of 1796 and
the Dish with One Spoon Covenant Wampum. With this, we respect the longstanding relationships
that Indigenous Nations have to this land, as they are the original caretakers. We acknowledge historical
and ongoing injustices that Indigenous Peoples (First Nations, Métis, and Inuit) endure in Canada,
and we accept responsibility as a public institution to contribute
toward revealing and correcting miseducation,
as well as
renewing
respectful
relationships
with Indigenous communities
through our teaching, research, and community service.*

1. COURSE DESCRIPTION

Physics 1502 – Enriched Introductory Physics II (3 lecture hours, 3 laboratory hours, 0.5 course):
A calculus-based laboratory course for students intending to pursue further studies in science, particularly the physical sciences. Relativity, the electromagnetic interaction, the strong and weak interactions, oscillations, and waves.

Prerequisites: One of Physics 1501A/B (preferred) or Physics 1201A/B or Physics 1401A/B, or the former Physics 1301A/B or a minimum mark of 80% in the former Physics 1028A/B; Calculus 1000A/B or 1500A/B or Applied Mathematics 1412A/B.

Corequisite(s): Calculus 1501A/B (preferred) or Calculus 1301A/B, or Numerical and Mathematical Methods 1414A/B.

The former Applied Mathematics 1414A/B or the former Applied Mathematics 1413 can be used in place of Numerical and Mathematical Methods 1414A/B.

Anti-requisites: Physics 1021, Physics 1102A/B, Physics 1202A/B, Physics 1402A/B, the former Physics 1029A/B, the former Physics 1302A/B.

Unless you have either the requisites for this course or written special permission from your Dean 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 if you are dropped from a course for failing to meet the necessary requisites.

2. INSTRUCTIONAL TEAM

Course Instructor	Prof. Tamie Poepping Professor, Department of Physics and Astronomy poeping@uwo.ca
	Open-office Hours I'm available by appointment.
Teaching Assistant	To be announced. The course TA will be doing most of the tutorial marking and should be first point of contact for grading issues.
Lab Instructor	Dr. Shailesh Nene , Department of Physics and Astronomy physlab1@uwo.ca
Contact Info	<ol style="list-style-type: none">1. For all enquiries, use your UWO e-mail account (@uwo.ca). We will not respond to email from addresses other than your UWO email account as we cannot ensure the legitimacy of the sender from other sources; also, emails from other sources often won't make it through the UWO spam filter.2. Direct all lab-related questions to the lab instructor, Dr. Shailesh Nene.

3. COURSE OUTLINE

Brief Course Outline (Topic – *Textbook sections*) For a detailed description, see the attached course schedule.

1. Electric effects – *Chapters 21–26*
2. Magnetic effects – *Chapters 27–29*
3. Oscillations and waves – *Chapters 14–15*
4. Relativity – *Chapter 37*
5. Nuclear physics – *Chapter 43*

4. COURSE-LEVEL LEARNING OUTCOMES

By the end of the course, students will be expected to meet the specific learning outcomes identified below. Use the checklist to ensure complete coverage and understanding of the required topics or skills:

- use mathematical language at the level of integral calculus to solve analytic and quantitative problems in the general topics of electricity, magnetism, oscillations, and waves;
- extend and apply Newton's Laws of Motion and the principle of conservation of energy to electromagnetic and wave phenomena;
- develop a coherent microscopic description of electric and magnetic phenomena and use these to generate macroscopic laws;
- use periodic functions to quantify the displacement, velocity, acceleration, and energy in simple harmonic oscillations and waves;
- use Lorentz transformations to quantify relativistic effects of objects traveling close to the speed of light;
- explain nuclear stability and nuclear processes including fission and fusion;
- 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;
- 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;
- be able to continue in all physical science modules at the second-year level with a solid background.

5. COURSE DELIVERY

Lectures: 3 lecture hours per week **Online Western Learning (OWL)** system at <http://owl.uwo.ca> will be the home base and launching platform for all learning components. Students are responsible for checking the course OWL site on a regular basis. This is the primary method by which information will be disseminated to all students in the class outside of in-person lectures. Log in using your UWO username and password, then find the **PHYSICS 1502B 001 FW23** OWL site. Key buttons or tabs to explore:

- **Getting Started:** Starting point for access to Course Outline, Course Schedule, Learning Outcomes, etc.
- **Announcements:** important notices and reminders will be posted here. You can set your Preferences (menu beside your name in top banner) to send an email daily or for each posting.
- **Gradebook:** Grades for all course evaluation components will be posted here.
- **Unit Lessons:** Slides and notes posted under the corresponding Unit (Unit 1 to 5 in the sidebar).
- **Labs:** Helpful content, such as introductory slides or Excel help sheets. Links to the pre-lab quizzes and Gradescope submission site.

If students need assistance on technical issues in OWL, they can seek support on the OWL Help page. Alternatively, they can contact the Western Technology Services Helpdesk, which can be contacted by phone at 519-661-3800 or ext. 83800.

Laboratories: There will be four three-hour labs approximately every two weeks, alternating with tutorials; see Course Schedule for dates.

- Each lab involves completing a pre-lab quiz on OWL (via Tests & Quizzes tab), completing the lab worksheets during an in-person experiment, and submitting your completed worksheets via Gradescope.
- Direct all lab-related questions to the lab instructor, Dr. Shailesh Nene via physlab1@uwo.ca.
- Labs are located on the second floor of the Materials Science Addition (MSA) building. See Western's campus [maps](#) if needed.

Mastering Physics platform: Mastering Physics is a web-based instructional platform provided by the textbook publisher. A portion of class marks will come from completing homework assignments on Mastering Physics. Access is included with your textbook if purchased through the Western bookstore (now or last term for Physics 1501). Select the Pearson tab in OWL to access the course page in Mastering Physics.

Tutorials: Two-hour in-person workshops approximately every two weeks, alternating with the labs; see Course Schedule for dates. Location will be announced.

Drop-in Physics Help Centre: The drop-in Help Centre is in the Math & Physics Hub in the basement of the Physics and Astronomy Building. Help on course topics will be available on various days as per the schedule posted on OWL when it becomes available. We will strive to find a selection of times to enable access for everyone. The teaching assistants (TAs) in the Help Centre are physics and astronomy graduate students or volunteer undergraduate students specializing in physics (organized by PASA, the Physics & Astronomy Student Association).

Contingency plan for an in-person class pivoting to 100% online learning: Although the intent is for this course to be delivered in person, should any university-declared emergency require some or all of the course to be delivered online, either synchronously (*i.e.*, at the times indicated in the timetable) or asynchronously (*e.g.*, posted on OWL for students to view at their convenience). The grading scheme will **not** change. Any assessments will also be conducted online as determined by the course instructor.

6. COURSE MATERIAL

The following course materials are required:

- Textbook** The required textbook *University Physics with Modern Physics (15th edition)*, by H.D. Young and R.A. Freedman (Pearson) is available for purchase from The Bookstore at Western as either printed hardcopy or electronic version. The textbook is a resource for assigned readings and homework problems (see Course Schedule). Your bookstore purchase will include access to the course site on Mastering Physics, which will be used for homework assignments.
- Mastering Physics** Access to the Mastering Physics platform is required for completing the online assignments. If you already purchased access for last term, you do not need to purchase anything further. If you transferred from Physics 1201/1202 or 1401/1402 into Physics 1501/1502, contact me to arrange transfer of your Mastering Physics access.
- Lab Manual** *Physics Laboratory Manual 2023-2024 for Physics 1502 (required)*. The lab manual is available for purchase from the *Western Bookstore*. Ensure that you purchase the correct manual (for Physics 1502) as it is not refundable.

7. COURSE EVALUATION

The overall course grade will be calculated from the following components:

Assignments	20%	• Best 5 of 6 counted; no make-ups; completed on Mastering Physics.
Tutorials	10%	• Best 3 of 4 counted; no make-ups; in person, alternating with labs.
Labs	10%	• 4 labs; no make-ups; in person.
Quizzes	20%	• 2 quizzes worth 10% each; no make-ups; scheduled during tutorials.
Final Examination	40%	• Date, time, and location to be announced by Registrar's Office.

See the *Physics 1502 Course Schedule* for details of timelines and deadlines for all components.

Assignments on Mastering Physics: Six assignments are to be completed to help you gain deeper understanding of physics concepts and problem-solving. Your best 5 of 6 scores will be counted. No make-ups will be offered.

Tutorials: Students are expected to attend and participate in the tutorials, which complement the lectures and labs and will occur in the week prior to each experimental lab; see the Course Schedule. The tutorials will focus on developing computational skills and collaborative problem solving. Your tutorial grade will be based on participation and submitting completed worksheets at the end of the tutorial. You should bring a laptop to the tutorials if you can, but you can also print out the worksheets and work with a classmate on their computer.

Laboratories: This course has a hand-on lab component to improve your experimental and data analysis skills.

- There are **4 independent labs**, and each lab is worth 2.5% with 0.5% for the pre-lab quiz and 2.0% for the lab report (worksheets). The pre-lab and lab components are graded individually; for example, if you missed completing the pre-lab quiz for any lab but submitted the lab worksheets before the deadline, you will lose 0.5% of that lab and you only get 2% for the lab worksheets. An incomplete or failed lab will be recorded as a zero and included in your lab average score. A lab may be missed with appropriate documentation (see Academic Considerations and Academic Policies below), and then the final lab mark will be the average of the other lab marks.
- **Pre-lab quiz on OWL:** for each lab, read the manual and complete the corresponding pre-lab quiz on OWL before proceeding to the lab session. This will help prepare you for the lab and facilitate finishing the lab on time. You need a quiz score of $\geq 75\%$ to pass but have unlimited attempts. Failure to meet this requirement will lead to zero on the pre-lab quiz.
- **Lab worksheets:** The lab worksheets should be completed and scanned (or photographed) for submission via the Gradescope link on OWL. Worksheets should be submitted before the end of your lab session; if necessary, you have until the end of the following Wednesday as indicated on Gradescope, but late submissions beyond that will NOT be accepted. The labs are pass/fail; a portion of each lab will

be selected for grading, and a grade of $\geq 5/10$ is needed to pass along with $\geq 75\%$ on the corresponding pre-lab quiz.

Quizzes: Your understanding of the course content will be assessed over the term through two in-person quizzes scheduled during the tutorial/lab time slot (Mondays 2:30–5:30 PM). The quizzes are timed assessments to provide practice problem solving under a time constraint as applicable for the final exam. See the Course Schedule for expected quiz dates; date, time, and details are subject to change. A calculator will be allowed. Note that make-ups are not held for the quizzes: if you must miss a quiz due to a serious medical or other issue, the marks from the quiz will be transferred to the final exam.

Final examination: The final exam will be in-person. The date and time will be determined and announced by the Office of the Registrar in February. A formula sheet will be allowed (details to be provided later). A calculator will be allowed.

Grades: All scores will be transferred to the Gradebook on OWL. Any errors, or appeals to your scores, must be reported to your instructor (via poeppling@uwo.ca) within two weeks of their initial posting. Please note: a) your final exam mark will only be posted to OWL after the end of the exam period, b) your final course grade must come officially from the Registrar's Office and will not be posted on OWL, and c) final course grades may need to be adjusted in order to conform to departmental policy.

8. **ACADEMIC CONSIDERATIONS**

A. Academic Consideration for Student Absence — If you are unable to meet a course requirement due to illness or other serious circumstances, please follow the procedures below (and the subsequent section on *Make-up Policy*):

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

The marks for tutorials and Mastering Physics assignments will be calculated based on the best $n-1$ of n possible for each type of evaluation. As a result, there will be no make-ups for missed tutorials or assignments. For example, since there are 5 tutorials, the final grade for the tutorial component will be based on the best 4 tutorial worksheets submitted. Exceptional circumstances (such as an extended illness) will be addressed on a case-by-case basis.

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

For work 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. For further information, please consult the University's medical illness policy at

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

The Student Medical Certificate is available at

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

For Physics 1502, the only course components worth 10% or more (except the final exam) are the two midterm quizzes. Note that no make-up quizzes will be offered; if you miss a quiz and academic consideration is granted, the points for the quiz will be transferred to the final exam.

Note that individual instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds, or for other reasons. *All documentation required for absences must be submitted to the Academic Counselling office of a student's Home Faculty.*

Students are encouraged to contact their Faculty academic counselling office to obtain more information about the relevant documentation and visit the Faculty of Science website on [Academic Consideration](#).

B. Make-up Policy

a) **Assignments** – 6 assignments will be available online over the course term; the best 5 of 6 are counted, thus your lowest mark will be dropped, which allows you to miss one assignment without penalty – preserve and apply it wisely as no make-up assignments will be given.

- b) **Labs** – No make-up labs are offered. If a lab is missed and academic consideration is granted, the average from your other lab grades will be applied. In all other cases, an incomplete lab will be recorded as a zero and included in your lab average score.
- c) **Tutorials** – The best 3 of 4 tutorial submissions are counted, which allows you to miss one tutorial without penalty; no make-up tutorials will be given, and further absences will be recorded as a zero and included in your average score.
- d) **Quizzes** – Two quizzes are scheduled over the course term. If a quiz is missed due to an approved absence, the corresponding grade component will be reweighted to the Final Exam. No make-up quiz will be offered.
- e) **Final Examination** – If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you are able. 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 a 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 (e.g., the following April for this course). 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 Examinations](#)).

9. **ACADEMIC POLICIES**

Please refer to the UWO Academic Policies http://www.uwo.ca/univsec/academic_policies/ for further details on the policies in practice here. The website for Registrarial Services is www.registrar.uwo.ca.

In accordance with policy, www.uwo.ca/its/identity/activatenonstudent.html, 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 his/her official university address is attended to in a timely manner.

A. Scholastic Offences

“Success (and failure) will come and go, but integrity is forever” - Amy Rees Anderson

[What is Academic Integrity?](#) Please review this site (from the Centre for Teaching and Learning) and course OWL tab on **Academic Integrity** – your learning should matter to you! (teaching.uwo.ca/teaching/assessing/academic-integrity.html)

University Policy states that cheating, including plagiarism, is a major scholastic offence. 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: www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

The commission of a scholastic offence is attended by academic penalties that might include expulsion from the program. If you are caught cheating, there will be no second warning.

As per the UWO Academic Policies:

- Plagiarism: Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing, such as footnotes or citations.
- All required papers may be subject to submission for textual similarity review to the commercial plagiarism-detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).
- Computer-marked multiple-choice tests and/or exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

B. Online Course Conduct & Netiquette:

Note that disruptive behaviour of any type during classes or online components, including inappropriate use of online forums or chat features, is unacceptable. Students found guilty of Zoom-bombing a session or of other serious online offenses may be subject to disciplinary measures under the Code of Student Conduct.

Only students using their UWO credentials will be permitted to access the course elements. If, for privacy reasons, you wish to use a pseudonym, you must have the pseudonym pre-approved by the course coordinator before being allowed to participate in any online component.

If you are experiencing any online harassment or bullying through the course platforms, report the behaviour immediately to your instructor.

General considerations of “netiquette”:

- Use your computer and/or laptop if possible (as opposed to a cell phone or tablet).
- Keep in mind the different cultural and linguistic backgrounds of the students in the course.
- Be courteous toward the instructor, your colleagues, and authors whose work you are discussing.
- Be respectful of the diversity of viewpoints that you will encounter in the class and in your readings. The exchange of diverse ideas and opinions is part of the scholarly environment. “Flaming” is never appropriate.
- Be professional and scholarly in all online postings. Use proper grammar and spelling. Cite the ideas of others appropriately.

C. Remote Proctoring Software In the event of a health-related lock-down, tests and examinations in this course will be conducted using a remote proctoring service. 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 site: remoteproctoring.uwo.ca/.

D. Complaints and Suggestions: If you have a concern about something, please let us know. We rely on your feedback. Please contact initially the person most directly concerned – this will usually be your instructor. If that is not satisfactory, or if there is something more general bothering you, talk it over with the Physics & Astronomy Department Chair or the Associate Chair of Undergraduate Affairs (for contact information see <http://www.physics.uwo.ca/>).

10. ACCOMMODATION AND ACCESSIBILITY

A. Accommodation Policies – Students with disabilities should work with Western’s Accessible Education (formerly Services for Students with Disabilities, SSD), which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. For more information, refer to the Academic Accommodation for Students with Disabilities [policy](#).

B. Religious Accommodation – When a course requirement 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 at least two weeks prior to the holiday to the course instructor and the Academic Counselling office of their Faculty of Registration. Please visit the Diversity Calendars posted on our university’s EDID website for the recognized religious holidays at the following: www.edi.uwo.ca.

11. SUPPORT SERVICES

Accessibility — 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 Student Accessibility Services (SAS) at (519) 661-2147 if you have any questions regarding accommodations.

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: www.uwo.ca/se/digital/.

Counseling — Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on add/drop courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: <https://www.uwo.ca/sci/counselling/>

Learning Skills — Learning-skills counsellors at the Student Development Centre (www.sdc.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.

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

Science Student Donation Fund — This course gratefully acknowledges support from the Science Student Donation Fund. If you are a B.Sc. or B.M.Sc. student registered in the Faculty of Science or Schulich School of Medicine and Dentistry, you contribute to the Science Student Donation Fund, which is administered by the Science Students' Council. One or more grants from the Fund have allowed for the purchase of lab equipment integral to teaching this course. 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. In the front pages of your lab manual, you will find examples of some the lab equipment partially funded through the Science Student Donation Fund.

Student Council services — Additional student-run support services are offered by the USC, westernusc.ca/your-services/#studentservices.