Western Science

Department of Physics & Astronomy

Physics 1402B Course Outline

1. Course Information

Course Information
Physics 1402B (0.5 course), Introductory Physics II, Winter 2025.

List of Prerequisites
One of Physics 1201A or 1401A or 1501A, or permission from the Department of Physics & Astronomy and the Dean of your home Faculty.

Unless you have either the prerequisites 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 in the event that you are dropped from a course for failing to have the necessary prerequisites.

Anti-requisites: Physics 1202B, 1502B, the former Physics 1102B, 1029B, 1302B.

2. Instructor Information

Instructor: Prof. Baker
Course Coordinator: Dr. Isabelle Cyr

Questions/ Course Contact Info

Due to the large number of students in the course, we will use the JIRA ticket system to make sure all questions are responded to in a timely manner. For any questions or course inquiries, please create a ticket at the following link: https://help.sci.uwo.ca/servicedesk/customer/portal/8.

Office Hours and Help Centre Hours

Help centre hours will be posted on the course website and discussed in class. These help centres will be run by the course TAs, and Baker will stop by at designated times. If you need to speak to Baker in office hours (something you can't discuss in the help centre hours), please speak to him after class or create a JIRA ticket to schedule an office hours appointment.

Students must use their Western (@uwo.ca) email addresses in all course communications.

3. Course Syllabus, Schedule, Delivery Mode

A calculus-based laboratory course in physics covering the principles of electric fields and potential, capacitance, DC circuits, magnetic fields, electromagnetic induction, oscillations, and waves.

Course delivery includes three weekly in-person lectures, tutorials, assignments, and a laboratory component.

Students are responsible for checking the course OWL site (http://owl.uwo.ca) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class.

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:

- provide a coherent microscopic description of electric and magnetic phenomena and use these to generate macroscopic laws.
- extend and apply Newton's Laws of Motion and the principle of conservation of energy to electromagnetic and wave phenomena.
- use periodic functions to quantify the displacement, velocity, acceleration, and energy in simple harmonic oscillations and waves.
- 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
- acquire an intuitive understanding of fundamental physics concepts
- 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.

Key Dates:

Classes begin: January 6, 2025
Midterm 1: Sunday Feb 2, starting at 1:00pm
Spring Reading Week: February 15 – 23, 2025
Midterm 2: Saturday Mar 8, starting at 10:00am
Classes end: April 4, 2025
Exam period: April 7 – 30, 2025

Course Schedule (tentative):

Week	Primary Topic(s) (Estimated)	*Assignment Due Dates*
1. Jan 6-10	Simple harmonic motion, forced/damped oscillations	
2. Jan 13-17	Waves, standing waves	*Assignment 1 + Resubmission*
3. Jan 20-24	Electric field	
4. Jan 27-31	Electric potential	*Assignment 2 + Resubmission*
Sun, Feb 2	***Midterm 1***	***Midterm Starts at 1:00pm***
5. Feb 3-7	Gauss's law, conductors	
6. Feb 10-14	Kirchoff's laws, circuits	*Assignment 3 + Resubmission*
Feb 15-23	*No classes (Reading Week)*	*No classes (Reading Week)*
7. Feb 24-28	Magnetic field	
8. Mar 3-7	Ampere's law	*Assignment 4 + Resubmission*
Sat, Mar 8	***Midterm 2***	***Midterm Starts at 10:00am***
9. Mar 10-14	Faraday's law, Maxwell's equations	
10. Mar 17-21	Inductors, RLC circuits	*Assignment 5 + Resubmission*
11. Mar 24-28	Electromagnetic waves	
12. Mar31-Apr4	Bonus topics (if time), review	*Assignment 6 + Resubmission*

Assignments are due Tuesday at 9:00am during the week indicated on the above schedule. There is a 48 hour no-late-penalty period, where you can submit this until Thursday at 9:00am without penalty. Thursday morning, assignment solutions will be posted and therefore assignments will no longer be accepted. Assignment resubmissions are then due that Saturday by 5pm. However, resubmission deadline are more flexible, you have two extra weeks to submit these without penalty. See Section 5. Methods of Evaluation for more assignment details.

4. Course Materials

Lecture Notes: Typed lecture notes for each lecture will be made available for free on OWL. These notes are comprehensive and are the primary material to study from in the course.

Textbook: University Physics, Young & Freedman, 15th edition, Pearson, 2020 in combination with *Mastering Physics* from Pearson and with *Perusall*. These are the same materials as for PHY 1401A. You do not need a new textbook or a new *Mastering Physics* access code if you have already purchased these.

***Mastering Physics*:** An access code for *Mastering Physics*, the accompanying on-line learning resources, and access to *Perusall* is included in the textbook package. The access code can also be bought separately, in case you bought a used textbook. There is no need to buy separate codes if you already purchased them for PHY 1401A. Sign into your existing *Mastering Physics* account at www.pearson.com/mastering. Once you are in your Pearson account ('My Courses' appears near the top left), simply look near the top right for the blue 'Enroll in a course' button. Select that and then paste in the courseID: **baker49553**. The system will recognize you were already in

Mastering Physics in the Fall and permit you to join our new *Mastering* course without additional payment or access code!
Do not register with any other e-mail accounts such as GMail, Yahoo, etc. because if you do, **your grades may be lost** if we transfer any grades from the Pearson site to Western's OWL site. OWL recognizes only the e-mail addresses ending with @uwo.ca.

Lab Manual: Physics Laboratory Manual 2024-2025 for Physics 1402B. This Lab Manual will be available for purchase on *Perusall*, or directly from the Western Bookstore. You need to purchase the second-semester lab manual separately; it is different from the first-semester lab manual.

OWL: The course OWL will contain all lecture notes and important course material. This will also contain a link to *Perusall* and a link to *Mastering Physics.*

A calendar with course deadlines, lecture notes, access to interim grades, announcements, etc., is available from the course OWL site.

Students are responsible for checking the course OWL site (http://owl.uwo.ca) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class.

All course material will be posted to OWL: http://owl.uwo.ca.

If students need assistance with the course OWL site, 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.

5. Methods of Evaluation

Student performance will be evaluated regularly throughout the term with the following:

Assignments

- **Six Assignments:** A maximum of six assignments will be posted to OWL, featuring questions which must be answered by writing on paper (or writing tablet). These answers must then be scanned and submitted to OWL in a single .pdf file before or during 48 hour no-late-penalty window. Assignments submitted after this window will be given a grade of 0%, because full solutions are posted at the end of the assignment submission window. Assignments grades are given on a pass/fail basis, 2% of your overall grade per assignment.
- **Assignment Resubmissions:** After each written assignment, written resubmissions must also be submitted to OWL, by Saturday at 5pm following the assignment deadline. Full solutions to each problem will be posted to help with your resubmission. In the resubmission, you are required to resubmit only any problems you answered incorrectly on the initial submission. If you answered all correctly in the first submission, you must upload a .pdf that states: No Corrections, somewhere on the page. Resubmission deadlines are more flexible, you have up to one additional week to

submit without penalty (after this -0.1% per day). Like the assignments, each resubmission is worth 1% of your overall grade.

- **Mastering Physics** The plan is that no graded assignments will be given through Mastering Physics, and that this will only be used to give additional practice problems. However, we reserve the right to replace any one or more of the written assignments + resubmissions with a Mastering Physics assignment. Such an assignment will have no resubmission, therefore would count for 3% of your overall assignment grade.

Note: For the total maximum 18% given on assignments + resubmissions, your lowest 3% will be dropped, therefore counting only the best 15/18 for your final grade.

Exams

- **Two Midterms** and a **Final Exam**. All exams are cumulative but will focus on the more recent material since the previous exam.
- **Makeup Exams** There will be no makeup midterms in this course. If you receive permission from academic counselling to miss a midterm, this 20% 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. The final exam must be taken: there will be one makeup final exam. See section 6. Student Absences for more details.

Labs

- **Four labs.** See the lab information sheet on OWL for all lab related info. There are four labs this semester. The lab component of the course is under the responsibility of Dr. Shailesh Nene. Any questions about the labs should be addressed to him via a JIRA ticket. Each lab is worth 2.5% of your overall grade.

Tutorials

- **Six tutorials.** Tutorials are required in this course, which will occur on weeks opposite to your lab in the same timeslot. Each tutorial is worth 1% of your grade. Grades are pass/fail, based on an escape room style tutorial where you must complete weekly task(s) before leaving and being granted the 1% for that week. The best 5 of 6 tutorials will be counted for the course. In tutorials: a) using any source other than the course lecture notes and text, is not allowed, b) using notes from someone who already completed the tutorial, is not allowed. If you use a) or b), you will receive a maximum grade of 0.5% for that weeks tutorial.

  The overall course grade will be calculated as listed below:

Assignments + Resubmissions (Best 15/18 total % grades)	15%
Tutorials (Best 5 of 6)	5%
Labs	10%
Midterm Exams, 20% each	40%
Final Exam (scheduled by Registrar's Office)	30%

The Department of Physics & Astronomy may, in exceptional cases, adjust the final course marks to conform to Departmental policy.

6. 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, the best 15 out of a total possible 18 percentage points will count towards the mark.
- **Tutorials:** if you cannot make a tutorial, you must contact your tutorial TA directly. They will have other sections they are teaching where you can make the tutorial up. Alternatively, they will give you options for other TA's sections. Every 2 weeks the tutorials change topic, so you have 2 week windows to complete each tutorial. The best 5 of 6 tutorials count towards your grade.
- **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 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.

7. 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).

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.

8. Academic Policies

The website for Registrarial Services is http://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.

There are no restrictions on calculators. However, 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:

http://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.

9. 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.