

## Physics 1402B Course Outline

### 1. Course Information

#### Course Information

Physics 1402B (0.5 course), Introductory Physics II, Winter 2024.

	1402B Section 001	1402B Section 002
Lectures		

#### 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

Prof. Alexei Ouriadov (sect. 001),  
Prof. Giovanni Fanchini (sect. 002),  
Dr. Isabelle Cyr (coordinator),

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For any course-related issues or questions, please see your instructor after class, or create a JIRA ticket at <https://help.sci.uwo.ca/service/servlet/customerportal/8>. Please, allow 48 h for a response. Instructors will not be able to respond to direct email. See Section 4 for information on Labs and the lab instructor.

Students must use their Western (@uwo.ca) email addresses when communicating with their instructors.

### 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, *Mastering Physics* simulation learning tools, demonstration videos, *Mastering Physics* problem solving videos, *Mastering Physics Dynamic Study Modules (DSM)*, and a laboratory component with 4 labs.

#### 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.
- 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 sessional dates

Classes begin: January 8, 2024

Winter reading week: February 17 – 25, 2024

Classes end: April 8, 2024

Exam period: April 11 – 30, 2024

#### Contingency plan

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 or asynchronously, the course will adapt accordingly. The grading scheme will not change. Any assessments affected will be conducted online as determined by the course instructor.

**Course Schedule (tentative and subject to change without notice):**

<b>Week</b>	<b>Y&amp;F Sections</b>	<b>Topics</b>	<b>DSM/Lab</b>
1. Jan 8-12	21.1, 21.2, 21.3, 21.4, 21.5, 21.6, 21.7	Electric charge; Coulomb's law; electric force and field; charge distributions; matter in electric fields	
2. Jan 15-19	23.1, 23.2, 23.3, 23.4, 23.5	Electric potential energy and potential; equipotential surfaces; electric potential gradient	<i>DSM #1 due by end of Tue</i>
3. Jan 22-26	24.1, 24.2, 24.3, 24.4, 24.5	Capacitors and capacitance; capacitors in series and parallel; energy storage in capacitors and electric field energy; dielectrics	<i>DSM #2 by end of Tue</i>
4. Jan 29-Feb 2	25.1, 25.2, 25.3, 25.4, 25.5	Electric current; resistance and Ohm's law; electrical power; electromotive force; safety	
5. Feb 5-9	26.1, 26.2, 26.3, 26.4	Electric circuits; Kirchhoff's rules; Electrical measurements	Lab #1 by 11:55am Mon, Feb 6
<b>Sat, Feb 10</b>		<b><i>Midterm 1</i></b>	<b><i>9.00 am – 12.00 pm</i></b>
6. Feb 12-16	26.5, 27.1, 27.2, 27.3, 27.4, 27.5, 27.6	R-C circuits; Magnetic force & field; Magnetic flux; Motion of charged particles in a magnetic field; Magnetic force on current wires	<i>DSM #3 due by end of Tue</i>
<i>Feb 17-25</i>		<i>No classes (Reading Week)</i>	<i>No classes (Reading Week)</i>
7. Feb 26-Mar 1	27.7, 27.8, 27.9, 28.1, 28.2, 28.3, 28.4, 28.5	Current loops; DC motor; Hall effect; Magnetic force & field: moving charges, conductors; Magnetic materials	Lab #2 by 11:55am Mon, Feb 27
8. Mar 4-8	28.6, 28.7, 28.8, 29.1, 29.2, 29.3	Ampère's Law; Magnetic induction; Faraday's law; Lenz's law	<i>DSM #4 due by end of Tue</i>
9. Mar 11-15	29.4, 29.6	Motional EMF; eddy currents	Lab #3 by 11:55am Mon, Mar 13; <i>DSM #5 by end of Tue</i>
<b>Sat, Mar 16</b>		<b><i>Midterm 2</i></b>	<b><i>9.00 am – 12.00 pm</i></b>
10. Mar 18-22	14.1, 14.2, 14.3, 14.5, 14.6, 14.7, 14.8	Simple harmonic motion; Energy in SHM; Pendulums; Damped and forced oscillations; Resonance	<i>DSM #6 due by end of Tue</i>
11. Mar 25-29	15.1, 15.2, 15.3, 15.4, 15.5, 15.6, 15.7, 15.8	Properties of waves; Energy transport by waves; Interference; String instruments	Lab #4 by 11:55am Mon, Mar 27; <i>DSM #7 by end of Tue</i>
12. April 1-5	16.2, 16.2, 16.2, 16.3, 16.6, 16.7	Sound waves; Interference; Beats	<i>DSM #8 due by end of Tue</i>

## 4. Labs

The first-year physics laboratories are managed by Dr. Shailesh Nene. All necessary information and instructions about the Labs can be found on the course OWL page and **any questions about the labs should be submitted via a JIRA ticket at <https://help.sci.uwo.ca/>.**

**Lab preparation:** The online Physics 1402 Lab Manual must be purchased through the Bookstore at Western. For all 4 labs, you are required to read and review all the information about the labs from the manual. After completing the reading for each lab, complete the pre-lab quiz before going to the respective lab. **All four labs will be in-person.**

**Pre-lab quiz:** For each lab, you must complete the online pre-lab quiz on your course OWL before proceeding to the lab. You need a minimum score of 75% to pass each pre-lab quiz. You will have unlimited attempts for the pre-lab quiz before the deadline. Each lab has a pre-lab quiz worth 0.5% of the course grade. *If you fail to complete the pre-lab quiz, you will receive a zero for the lab regardless of the score on your lab report.*

**Lab attendance:** The labs take place in the Material Science Addition (MSA), right above the first-year chemistry labs. Note, you need to go through the Chemistry Building to get there. During the lab, you will work in a group of 2 to 4 students. Please follow your lab timetable which has the correct information about each lab date, time, and room based on your sub-section. Complete your lab report individually on the lab worksheets and then upload them to GradeScope (see link on course OWL). **There are no make-ups for missed labs!**

**Lab report submissions:** The lab worksheets must be uploaded to Gradescope and will be graded as pass/fail. Ensure the worksheets are legible. Each lab is graded out of 10 points; you will need a minimum of 5 points to pass each lab report with a full score. *Each lab report is worth 2.0% of the course grade.* The following are the individual lab report deadlines that need to be met to pass each of the labs:

- **Sunday, Feb 4, 2024, 23:55 (11:55 PM) for the Electric Circuits I Lab.**
- **Sunday, Feb 18, 2024, 23:55 (11:55 PM) for the Electric Circuits II Lab.**
- **Sunday, Mar 10, 2024, 23:55 (11:55 PM) for the Magnetic Forces Lab.**
- **Sunday, Mar 24, 2024, 23:55 (11:55 PM) for the Simple Harmonic Motion Lab.**

We cannot accept late submissions. If your lab report is NOT submitted before the deadline, it will NOT be graded. You are allowed to submit multiple submissions before the deadline in case you need to make edits. If you encounter any technical errors, submit a JIRA ticket **BEFORE the lab submission deadline.**

**Academic consideration:** You will be awarded zero marks for any late or missed lab submission without valid academic consideration. If you are unable to attend or submit the lab due to any medical/personal/family reason, please contact the academic counsellors with VALID documentation. If granted academic consideration for a missed lab or late report, you must open a JIRA ticket <https://help.sci.uwo.ca/> within 24 hours. *If you FAIL to contact us within 24 hours of approved academic consideration being granted, you will NOT get any marks for the missed lab.*

**Lab grade:** All 4 lab grades will be counted toward the final lab grade. Each lab is worth 2.5% (0.5% for pre-lab quiz + 2.0% for lab report), for a total of 10% of the course grade.

## 5. Course Materials

**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, 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](http://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: *fanchini62222* or *ouriadov33894*. 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** when transferring 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 2022-2023 for Physics 1402B. This Lab Manual will be available for purchase **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 site contains a link to *Perusall* for reading and annotation; a link to *Mastering Physics* with simulation learning tools, demonstration videos, problem solving videos, *Dynamic Study Modules*, and the course outline quiz. The OWL site also contains lecture videos and links to the labs.

Students are responsible for checking the course OWL site (<http://owl.uwo.ca>) and this document 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.

### **Technical Requirements**

For Zoom office hours: stable internet connection, computer with working microphone and/or webcam

For exams, problem-solving: a non-programmable, scientific calculator.

## 6. Methods of Evaluation

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

- **Eight *Dynamic Study Modules on Mastering Physics*:** all open at the start of the course. These should be completed as you progress through the material. Each *Dynamic Study Module* is worth 3% of your mark, for a maximum of 18% among the 8 Modules.
- **Two Midterms and a Final Exam.** All exams are cumulative and cover all course material until the time they are offered. They are closed-book, and no cheat sheets / formula sheets are allowed.
- **Four labs.** To receive credit for each lab:
  - complete and pass with  $\geq 75\%$  mark your pre-lab quiz under Tests & Quizzes;
  - ensure that your lab worksheet score on *Gradescope* is  $\geq 50\%$ ;
  - if both are true above, your lab score on OWL will be 100%.

The overall course grade will be calculated as listed below:

<i>Mastering Physics Study Modules</i> (best 6 out of 8) 3% each	18% total
Laboratory, 2.5% each	10% total
Midterm Exams, 18% each	36% total
Final Exam (scheduled by Registrar's Office)	36%

**Important: In order to pass Physics 1402B, a student must obtain:** a mark of  $\geq 75\%$  in the laboratory component. Students failing the lab component will be assigned a final course mark of no more than 48%.

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

## 7. 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:

- **Dynamic Study Modules (3% each):** no accommodations or make-up for Dynamic Study Modules. The best 6 out of the 8 will count towards the mark.
- **Absence from a Lab (2.5% each):** 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 in **24 hours** via JIRA with the subject line "Missed lab <lab name> - requesting accommodation" to arrange to take an on-line version of a missed lab (see sect 6, "Labs")

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

For work totaling 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/accommodation\\_medical.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf).

The Student Medical Certificate is available at

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/medicalform.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf).

- **Midterms (18% each):** No makeup is offered if you are excused from one Midterm with valid medical or supporting documentation (see above): in this case, the missing grade will be made up by re-weighting the grades from the other Midterm and the Final Exam (i.e., the sum of the grades of your other Midterm and the Final is multiplied by 4/3). If you are excused from *both* Midterms with valid medical and/or supporting documentations (see above) you will be allowed to write *one* makeup Midterm after the end of the course.
- **Labs (10% total):** You will be awarded zero marks for any late or missed lab submission without valid medical or supporting documentation. If you are granted academic consideration from the Academic Counselling Office for a missed lab or late report, you must open a JIRA ticket <https://help.sci.uwo.ca/> within **24 hours**. *If you FAIL to contact us within 24 hours of approved academic consideration being granted, you will NOT get any marks for the missed lab.*

### Absences from Final Examination:

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. If you miss the *two* Midterms *and* the Final (all of them with valid medical and/or supporting documentations) you will also be asked to write the makeup Midterm the next time this course is offered to avoid a "Multiple-Exam Situation" with your Special Examination. 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](#)).

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 or other symptoms is not sufficient on its own.

## 8. Accommodation and Accessibility

### 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 accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at

<https://multiculturalcalendar.com/ecal/index.php?s=c-univwo>.

### 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](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf).

## 9. 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](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, and programmable calculators are also not allowed. Mobile phones are also **not** allowed during Midterms or Final exams, not even for their use as watches or calculators.

**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](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>.



## 10. 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](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](mailto: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](http://academicsupport.uwo.ca/accessible_education/index.html)

if you have any questions regarding accommodations.

Learning-skills counsellors at the Student Development Centre (<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 BSc or BMSc 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 Counselling 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 <mailto:ssc@uwo.ca>.