

IPS*1510 - Integrated Mathematics and Physics II

Winter 2024 Course Outline

Section: 01

Credits: 1.00

Land Acknowledgement: Guelph

The University of Guelph resides on the ancestral lands of the Attawandaron people and the treaty lands and territory of the Mississaugas of the Credit. We recognize the significance of the Dish with One Spoon Covenant to this land and offer respect to our Anishinaabe, Haudenosaunee and Métis neighbours. Today, this gathering place is home to many First Nations, Inuit, and Métis peoples and acknowledging them reminds us of our important connection to this land where we work and learn.

Calendar Description

This is the second foundational course for students in B.Sc. mathematical and physical sciences majors. The disciplines of Mathematics and Physics are taught in an integrated fashion that demonstrates how they support and enrich one another. Thermodynamics, integration, electrostatics, partial derivatives, multidimensional integrals, simple harmonic motion, Taylor's series, and spectroscopy are presented in a harmonized fashion to ensure students have an improved understanding of these fundamentals.

Prerequisite(s): IPS*1500

Restriction(s): MATH*1090, MATH*1210, MATH*2080, PHYS*1010, PHYS*1070, PHYS*1130

Department(s): Department of Physics, Department of Mathematics and Statistics

Course Objectives

The course is intended to give a student a grounding in topics in physics and calculus in a manner that uses the physics as an example to ground the calculus and provides the calculus needed for the topics in physics. This integration of the two courses is intended to make both sets of material easier to absorb. Specific topics are listed subsequently under the heading Course Topics.

Lecture Schedule

MonWedFri 11:30am-12:20pm in MACN*113 (1/8 to 4/23)

MonWedFri 9:30am-10:20am in MACN*113 (1/8 to 4/23)

Lab / Seminar Schedule

Math Tutorial

Day	Time	Location	Sections
Friday	1:30 - 2:20	MAC 149	All

Physics Lab

Day	Time	Location	Sections
Tuesday	8:30 - 11:20	MACN 301/415	01
Tuesday	2:30 - 5:20	MACN 301/415	02
Wednesday	2:30 - 5:20	MACN 301/415	03
Thursday	2:30 - 5:20	MACN 301/415	04

Instructor Information

Paul Garrett

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Textbooks

Group	Title	Author	ISBN
Required	University Physics with Modern Physics	H. Young and R. Freedman	9780135159552

Learning Resources

Required Resources

Students must check for updates regularly on: Course link (Website) (<https://courselink.uoguelph.ca/>)

Recommended Course Resources

- Fast Start Calculus for Integrated Physics, Fourth Edition, by D. Ashlock (this will also be used as a reference in IPS*1510 in Winter 2022). Copies of this book are NOT available in the University Bookstore and the Co-op Bookstore but can be found on amazon.ca.
- Library Reference Material: There are many additional reference texts available on the library shelves. Look for call numbers beginning with QC21 or QC23 (Physics), QA155, QA303 (Math).

Campus Resources

If you are concerned about any aspect of your academic program: Make an appointment with a Program Counsellor (<https://www.uoguelph.ca/uaic/programcounsellors/>) in your degree program. If you are struggling to succeed academically: There are numerous academic resources offered by the Learning Commons (<https://www.lib.uoguelph.ca/using-library/spaces/learning-commons/>) including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills.

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Schedule of Topics and Assignments

Day:	Date:	Activities	Due:
Mon	2/19	Winter Break	
Mon	2/19	Winter Break	
Wed	2/21	Winter Break	
Wed	2/21	Winter Break	
Fri	2/23	Winter Break	
Fri	2/23	Winter Break	
Fri	3/29	Holiday - Classes Rescheduled to Monday April 8	
Fri	3/29	Holiday - Classes Rescheduled to Monday April 8	

Teaching and Learning Activities

Course Topics, by Week (Tentative)

Week	Physics Topic	Young and Freedman	Math Topics	Quick-Start
Jan. 8-12	Electric charges, forces, and fields	Ch 21	Differential Equations	9.1-9.2
Jan. 15-19	Electric force calculations	Ch 21	Differential Equations, Partial derivatives	9.3, 10.1
Jan. 22-26	Electric field calculations	Ch 21	Partial derivatives, gradients, directional derivatives	10.1-10.2
Jan. 29- Feb. 2	Work, Energy, Electric Potential	Ch 23	Tangent planes and optimization	10.3, 11.1
Feb. 5-9	Gauss' Law, MIDTERM	Ch 22	Extreme Value Theorem, MIDTERM	11.2
Feb. 12-16	Dipoles, Electric Flux	Ch 21, 24	Constrained optimization	11.3
Feb. 19-23	N/A	N/A	N/A	N/A
Winter Break (No Classes)				
Feb. 26- Mar. 1	Capacitance, Dielectrics, Circuits	Ch 24, 25	Volumes of rotation, arc length	12.1-12.2
Mar. 4-8	Circuit analysis: Ohm's Law	Ch 25	Surface area, review of integration	12.2, Ch 7
Mar. 11-15	Circuit analysis: Kirchhoff's Rules, MIDTERM	Ch 26	Multiple integrals, center of mass, MIDTERM	12.3
Mar. 18-22	Magnetism, Lorentz Force Laws	Ch 27	Sequences, geometric series	13.1
Mar. 25-29	Magnetic fields, Ampere's Law	Ch 28	Series-convergence tests	13.2
Apr. 1-5	Induction, Faraday-Lenz Law	Ch 29, 38	Power series, Taylor series	13.3-13.4

Tentative Physics Tutorial/Lab Schedule

Week	Date	Topic	Location
1	Jan. 8-12	N/A	N/A
2	Jan. 15-19	Physics Quiz 1/Physics Tutorial	MacN 415
3	Jan. 22-26	Physics Quiz 2/Physics Tutorial	MacN 415
4	Jan. 29 - Feb. 2	Physics Lab 1	MacN 301
5	Feb. 5-9	Physics Tutorial/ MIDTERM 1	MacN 415
6	Feb. 12-16 Feb. 19-23	Physics Lab 2 Winter break – No classes/tutorials/labs	MacN 301
7	Feb. 26- Mar. 1	Physics Quiz 3/Physics Tutorial	MacN 415
8	Mar. 4-8	Physics Lab 3	MacN 301
9	Mar. 11-15	Physics Tutorial/ MIDTERM 2	MacN 415
10	Mar. 18-22	Physics Lab 4	MacN 301
11	Mar. 25-29	Physics Quiz 4/Physics Tutorial	MacN 415
12	Apr. 1-5	Physics Lab 5	MacN 301

Assessment Breakdown

Assessment	Weight
Math Seminars	5 %
Math Quizzes (10)	15 %
Physics Quizzes (4)	10%

Physics Assignments (5)	10%
Laboratory Experiments (5)	10%
Midterm Exams x 2 (Dates TBA)	25%
Final Exam (Apr. 16)	25 %
Total	100%

Math Seminars

Mathematics tutorials will consist of a Q&A session with the TA. The TAs are probably going to run this in a fun and creative way to resemble a tournament of some sort. Your Math tutorial grade will be calculated based on attendance.

Math Quizzes

These quizzes are:

- every Monday,
- during lecture time,
- for 30 min,
- proctored by the TAs assigned for the course,
- total of 10 quizzes,
- each graded out of 10 marks,
- each consists of 2 questions

It is your responsibility to scan and submit properly to GradeScope in the next 10 min after the quiz. Any late submission will not be accepted. If you require any help or assistance in the uploading process, one of the TA's will help you.

Physics Assignments

There will be five problem-based assignments given throughout the semester; schedule TBD. Assignments will be posted on the Courselink site, and submitted in class or during the tutorial period.

Physics Quizzes

During four of the physics tutorial periods (see schedule), after receiving help for 90 minutes you will write a short quiz via Courselink. Details regarding what the quizzes will cover will be provided during the semester.

Laboratory Experiments

The physics lab experiments (see schedule below) are described in detail in the Lab handouts posted on CourseLink. Reports must be handed in using Jupyter Notebooks (Python).

Midterm Examinations

Two in-person midterm examinations will be held outside of class time; to be held (tentatively) in weeks 5 and 9 (exact date, time, and location TBA). The exams will mainly be solutions to problems based on material covered until week 4 and 8, respectively. Each exam will have an equal weighting towards your final grade. More details will be provided by your professors as the exam time approaches.

Final Examination

An in-person final examination will be held on Tuesday, April 16 from 8:30AM - 10:30AM. Details will be discussed during the semester. The exam will cover the entire course.

Physics Tutorial Periods

The tutorial periods will be devoted to the development of problem-solving skills.

Final Exam

Date: Apr 16

Time: Tu 8:30am-10:30am

Location: TBA *Please see Web Advisor closer to the date of scheduled final for location.*

To understand rules and regulations regarding Examinations students are encouraged to read Student's Responsibilities (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/examinations/>)

If the student is unable to meet the final exam requirements due to medical, psychological or compassionate circumstances they are encouraged to review Student's Responsibilities in the Academic Consideration, Appeals and Petitions (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-consideration-appeals-petitions/>) section of the Academic Calendar.

Last Day to Drop Course

The final day to drop Winter 2024 courses without academic penalty is the last day of classes: April 08

After this date, a mark will be recorded, whether course work is completed or not (a zero is assigned for missed tests/assignments). This mark will show on the student's transcript and will be calculated into their average.

Course Standard Statements

Getting Help

1. Your best source of help is your tutorial/lab instructor during the tutorial/lab period.
2. The course professors will be available to provide help (online for math, online or in person for physics) during their posted office hours. These will be announced in class and posted on Courselink. If you wish to obtain help from your professor at another time, please arrange a mutually convenient time via e-mail.
3. Physics Tutorials (<https://www.physics.uoguelph.ca/outreach/physics-tutorials/>) - There are a number of physics tutorials available for you on the Physics Department tutorial webpage.

Collaboration versus Copying

Scientists work alone or in groups, very often consulting fellow scientists and discussing their research problems with peers. Collaboration is a feature of scientific activity and there are many benefits to working with others. However, no ethical scientist would ever publish or claim the work of others as his or her own and generally scientists give reference to the appropriate source of ideas or techniques which are not their own.

You are a young scientist and, in this spirit, I encourage you to discuss with others as you learn the material and work on the problem assignments. However, the work that you submit as your assignment must be your own and not a copy of someone else's work. Identical scripts will be given a mark of zero and plagiarism will be dealt with severely. I encourage you to cite your references, citing books and other articles when they are used and acknowledging discussions with those who have helped you in your understanding and completion of the problem. This is good scientific practice.

Course Evaluation Information

The Department of Physics requires student assessment of all courses taught by the Department. These assessments provide essential feedback to faculty on their teaching by identifying both strengths and possible areas of improvement. In addition, annual student assessment of teaching provides part of the information used by the Department Tenure and Promotion Committee in evaluating the faculty member's contribution in the area of teaching.

The Student Feedback Questionnaire invites student response both through numerically quantifiable data, and written student comments. In conformity with University of Guelph Faculty Policy, the Department Tenure and Promotions Committee only considers comments signed by students. Your instructor will see all signed and unsigned comments after final grades are submitted. Written student comments may also be used in support of a nomination for internal and external teaching awards.

NOTE: No information will be passed on to the instructor until after the final grades have been submitted.

Standard Statements for Undergraduate Courses

Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-misconduct/>) is outlined in the Undergraduate Calendar.

Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability. Use of the SAS Exam Centre requires students to make a booking at least 10 days in advance, and no later than the first business day in November, March or July as appropriate for the semester. Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time. For students at the Guelph campus, information can be found on the SAS website. (<https://www.uoguelph.ca/sas/>)

Accommodation of Religious Obligations

If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements.

See the Academic calendar for information on regulations and procedures for Academic Accommodations of Religious Obligations (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-accommodation-religious-obligations/>).

Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all undergraduate students except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in the Undergraduate Calendar - Dropping Courses (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/dropping-courses/>).

Email Communication

As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

Health and Wellbeing

The University of Guelph provides a wide range of health and wellbeing services at the Vaccarino Centre for Student Wellness (<https://wellness.uoguelph.ca/>). If you are concerned about your mental health and not sure where to start, connect with a Student Wellness Navigator (<https://wellness.uoguelph.ca/navigators/>) who can help develop a plan to manage and support your mental health or check out our mental wellbeing resources (<https://wellness.uoguelph.ca/shine-this-year/>). The Student Wellness team are here to help and welcome the opportunity to connect with you.

Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g., final exam or major assignment).

Recording of Materials

Presentations that are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

Resources

The Academic Calendars (<http://www.uoguelph.ca/registrar/calendars/?index>) are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.

When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. See the Undergraduate Calendar for information on regulations and procedures for Academic Consideration. (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-consideration-appeals-petitions/>)