

DEPARTMENT OF PHYSICS AND ASTRONOMY  
TRENT UNIVERSITY

PHYS 1002H: Introductory physics II  
2014WI  
Peterborough

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**Course Description:**

This course covers electrostatics, magnetostatics, electromagnetism, optics and quantum physics in this course.

**Course Pre-requisites:** PHYS 1001H or PHYS 1020H, or permission of the department.

**Course Fees:** A \$10 charge collected in the first lab/tutorial session to cover the cost of the printed class notes and the lab manuals and materials.

**Required Text and Course Material:**

Printed class notes: These are the primary readings for the course. They will be distributed in class.

Text: *Physics for Scientists and Engineers*, R.D. Knight. This is an excellent text, developed from recent research on physics teaching. Use it to clarify points in the notes, and for supplementary readings, worked examples and assigned problems.

Voting clicker: This device, also purchased through the Bookstore, will enable you to reply electronically to questions asked during class, and is required. A resale market for the clickers is anticipated at the end of the year. The same clicker will work in all courses using them. Register using the online tool Blackboard (Bb).

Lab manual and materials: These will be distributed in the first lab session.

[Recommended supplementary resource: *Student Workbook* by R.D. Knight. This comes with the text if you buy it new. Otherwise, it can be purchased separately.]

### **Course Format:**

Please check <https://scheduler.trentu.ca/AcademicTimetable/> to confirm times and locations.

Classes: SC137 Monday 12:00 – 13:50 and Wednesday 12:00-12:50

Labs and tutorials: SC305 Tuesday **or** Wednesday; 09:00-11:50 **or** 13:00-15:50

### **Learning Outcomes/Objectives/Goals/Expectations:**

By the end of the course a successful student should:

- 1) have a conceptual understanding of electric and magnetic forces and fields.
- 2) be able to calculate the forces between charged and magnetic objects, including current-carrying wires and moving charges in a magnetic field.
- 3) understand electrostatic potential energy, and its relationship to the electric potential.
- 4) understand and analyse simple electrical circuits.
- 5) understand electromagnetic induction, Faraday's law, and the electromotive force.
- 6) have a working knowledge of ray optics, including Snell's law and its application to thin lenses.
- 7) have a basic understanding of wave optics, including interference, reflection, and diffraction.
- 8) have a basic knowledge of quantum mechanics, including wave-particle duality, the photoelectric effect, and the Bohr's model of the hydrogen atom.

### **Course Evaluation:**

<b>Type of Assignment</b> (e.g. test, essay, lab report, etc. and <b>provide an explanation for each</b> )	<b>Weighting (option 1)</b>	<b>Weighting (option 2)</b>	<b>Due Date</b>
Pre-class quizzes on Blackboard	5%	5%	Before each class
Clicker participation	5%	5%	Every class
Mastering Physics problem sets	0%	10%	Bi-weekly
Quizzes in tutorials	15%	5%	Bi-weekly
Tutorial participation	5%	5%	Bi-weekly
Laboratory	20%	20%	Bi-weekly
Midterm test	15%	15%	March 3, 2014 (wk 8)
Final Exam	35%	35%	Final Exam Period

## Week-by-week schedule:

The approximate schedule of topics is listed below. For a more precise weekly reading list see the document entitled see *PHYS 1002H Course Schedule*. I will follow the order of topics given and will regularly communicate in class and/or on the learningSystem/Blackboard about the pacing of the lectures. Naturally It is important for you to attend class and log on to the learningSystem/Blackboard regularly.

Week	Notes	Chapter in text
1	Electric charges and forces	25
2	Electric field, Gauss' Law	26, 27
3	Electric potential; Current	28,29,30
4	Electrical circuits	31
5	Magnetic fields	32
6	Electromagnetic induction	33
<b>Reading Week</b>		
7	Ray optics	23
8	<b>Midterm</b> and wave optics	21
9	Wave optics cont'd	22
10	Optical instrumentation	24
11	Quantum physics	39
12	Review	all

### **Pre-class quizzes**

Before each class students are assigned readings from the printed class notes (see the document *Course Schedule* for detailed information about these). There will be a short quiz on the reading to be done on Blackboard before each class. The deadline for completing each quiz is 8:00 am on the day of the class. To do a quiz, sign on to <http://learn.trentu.ca> and click on PHYS-1002H. From there select the appropriate reading assignment. The goal is to give an introduction to the material that will be discussed in the class. At this point some familiarity with the content is expected, but in-depth knowledge is not. For each question, full credit is given for the correct answer and half credit is given for an incorrect answer. Your four lowest quiz marks will be dropped, to allow for equipment malfunctions, etc.

### **Clickers**

Classes consist mostly of interactive discussions based on the pre-class readings. First, the instructor will briefly review the main points of the pre-class readings. Then, students will use "clickers" to answer questions illustrating key concepts. Students will have a chance to discuss the questions with their classmates and ask questions at this stage. You will receive 10 "points" for any class in which you answer at least 75% of the questions, and an additional 0.5 point for every question answered correctly. If you answer less than 75% of the questions you will receive zero. These scores will be averaged to give the "clicker" mark out of 5%. Your four lowest scores will be dropped before the final grade is calculated, to allow for weak batteries, equipment malfunction, etc. Use ONLY your own clicker – it is dishonest to use anyone else's, and the computer will not assign you the marks for voting. See the university policy below.

### **Problem Sets and Tutorial Quizzes**

A set of problems will be assigned roughly every two weeks. The problem sets are extremely important preparation for the mid-term test and final exam. Students have two options:

- Option 1: A set of problems will be posted on Blackboard. You are expected to answer and understand these problems, but you are not required to submit your work. Instead, you will be given a closed-book quiz at the beginning of each tutorial, lasting approximately 45 minutes, based on randomly chosen questions from the problem set. Note that this means you must complete the problem set before the beginning of each tutorial. The remaining assigned problems will not be graded, although the complete solutions will be posted later outside SC322. Help with the assignments is available during physics help sessions, and during my office hour.

• *Option 2:* A set of problems will be posted on the Mastering Physics website ([www.masteringphysics.com](http://www.masteringphysics.com)). This set includes the same problems as in Option 1, but also includes additional problems to help you learn the material. In this option, your entire assignment will be graded automatically by Mastering Physics and this will be counted towards your final grade. You will **also** be given the same closed-book quiz at the beginning of each tutorial as those students who choose Option 1, although the weight of the quiz towards the final grade is reduced.

Your final grade will be determined automatically for both options, based on which option gives the higher total. Note that all five of your problem sets will be counted under the same marking scheme: I will not count some assignments using Option 1 and some using Option 2.

## **Tutorials**

Tutorials are held every two weeks, and alternate with the laboratory sessions described below. They will then consist of (i) a quiz based on the previous problem set (discussed above), (ii) a review of the quiz solutions, and (iii) working on the present problem set. The problems in (iii) are solved through small-group discussion and with the help of tutorial leaders, and must be submitted to the tutorial leader at the beginning of the next tutorial. To obtain the tutorial participation grade you must attend at least the first two hours of the tutorial and make a reasonable effort to complete the tutorial work. Students who leave earlier or do not make sufficient effort on the tutorial work receive a participation grade of zero for that session.

## **Laboratories**

There will be a 3-hour laboratory, roughly every two weeks. In each laboratory, students will typically work in pairs to carry out an experiment as described in the lab manual. Individual written lab reports will then be prepared and submitted for grading. The goal is to give students hands-on experience with physical concepts, an opportunity to work with laboratory instruments, and practice developing written communication skills. Late lab reports will lose 10% per working day late without a valid excuse and documentation acceptable to the instructor (e.g., doctor's statement). Labs missed due to documented illness may be made up at the discretion of the Lab Demonstrator. If the Lab Demonstrator is unable to provide an alternative time, the labs which are completed will be prorated to provide the lab grade.

## **Tests and exams**

There will be a mid-term test on the course material covered in weeks 1-7, and a final exam covering the whole course.

### **Academic Integrity Policy:**

Academic dishonesty, which includes plagiarism and cheating, is an extremely serious academic offence and carries penalties varying from a 0 grade on an assignment to expulsion from the University. Definitions, penalties, and procedures for dealing with plagiarism and cheating are set out in Trent University's *Academic Integrity Policy*. You have a responsibility to educate yourself – unfamiliarity with the policy is not an excuse. You are strongly encouraged to visit Trent's Academic Integrity website to learn more: [www.trentu.ca/academicintegrity](http://www.trentu.ca/academicintegrity).

### **Access to Instruction Policy:**

It is Trent University's intent to create an inclusive learning environment. If a student has a disability and/or health consideration and feels that he/she may need accommodations to succeed in this course, the student should contact the Student Accessibility Services Office (SAS), (BH Suite 132, 705-748-1281 or email [accessibilityservices@trentu.ca](mailto:accessibilityservices@trentu.ca)). For Trent University in Oshawa Student Accessibility Services Office contact 905-435-5102 ext. 5024. Complete text can be found under Access to Instruction in the Academic Calendar.

### **Clickers (Personal Response Systems) Policy:**

As clicker records are used in this course to compute a portion of course grades, the use of a clicker other than your own is an academic offence. In lecture or tutorial, possession of more than one clicker, or that of another student, may be interpreted as intent to commit an academic offense.