

**Department of Physics/Astronomy, Trent University**  
**PHYS-FRSC 1001H *Introductory Physics I: 2015FA***  
**Peterborough Campus**

## **1. Course Information**

Prerequisite: 4U Advanced Functions or equivalent, or permission of the instructor.

Recommended: 4U Physics and 4U Calculus and Vectors.

### **1.1 Learning Outcomes**

A detailed schedule of readings as well as lab and tutorial activities is provided in the *Course Schedule*. The major topics covered in this course are mechanics, including kinematics, translational dynamics, work and energy, rotational dynamics, and simple harmonic motion. In addition, gravitation, fluids, elasticity, temperature and materials will be introduced.

At the conclusion of this course, a successful student should have

- (i) a conceptual understanding of the fundamental principles underlying these physical phenomena,
- (ii) the ability to describe these phenomena accurately both verbally and mathematically,
- (iii) analytical problem solving skills applicable to a wide range of issues within and outside of physics,
- (iv) a firm foundation for further study in physics.

### **1.2 Teaching Approach**

This course takes an interactive approach to learning. Course notes are provided in addition to the text, and students study assigned sections before each class. Class time is spent mostly in small group discussions of conceptual problems, followed by a vote on the correct answer, using electronic *clickers*. This provides instant feedback to students on their progress, and allows misunderstandings to be corrected quickly. See *Course Components* below for more details.

### **1.3 Course Description and Topics Covered**

Mechanics (Kinematics, Translational Dynamics, Work and Energy, Rotational Dynamics, Simple Harmonic Motion); Gravitation; Fluids; Elasticity; Temperature and Materials. See the *Course Schedule* for details of the readings and lab/tutorial activities.

## **2. Instructors' Information**

	<b>Lecturer</b>	<b>Laboratory Leader</b>	<b>Tutorial Leader</b>
Name	Ralph Shiell	Anton Knigavko	Ryan Cole
Email	<a href="mailto:ralphshiell@trentu.ca">ralphshiell@trentu.ca</a>	<a href="mailto:antonknigavko@trentu.ca">antonknigavko@trentu.ca</a>	<a href="mailto:ryancole@trentu.ca">ryancole@trentu.ca</a>
Phone	705-748-1011 x7023	705-748-1011 x7461	prefer email
Office Location	SC 214 (Science complex)	SC 319 (Science complex)	SC 211 (Science complex)
Office hours	Weds 11 – 12 pm, and by app't	By appointment	By appointment

Departmental Academic Administrative Assistant: Gina Collins, [physics@trentu.ca](mailto:physics@trentu.ca), 705-748-1011 x7715, SC 327 Physics Building

## **3. Course Format**

Classes: SC137 Monday 14:00 – 16:50

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

## **4. Required Text and Course Materials**

**Printed class notes (14 chapters):** These are the primary readings for the course and will be distributed in class.

**Textbook Physics for Scientists and Engineers, R.D. Knight, 3rd edition:** This is an excellent text, developed from recent research on physics teaching and available through the bookstore. Use it to clarify the notes, for supplemental readings, worked examples, and assigned problems.

**Mastering Physics:** This is an online educational tool, with access from the coursepack if you buy it new, or access can be purchased separately. Register: <http://www.pearsonmylabandmastering.com/northamerica/masteringphysics/>

**Voting clicker:** This required device, also purchased through the Bookstore, enables you to reply electronically to questions asked during class. We anticipate a resale market for the clickers at the end of the year. The same clicker will work in all courses using them. Register on-line as a Bb (Blackboard) quiz.

**Lab manual and materials:** These will be distributed in the first lab session. *Note:* There will be \$12 charge (cash) collected in the first tutorial session to cover the cost of all printed class notes, lab manuals and materials.

## **5. Course Evaluation**

Bi-weekly Bb quizzes	6%	(before each class, and during Thurs-Fri period)
Clicker participation in class	6%	(every class)
Assignments on MasteringPhysics	6%	(every two weeks)
Assignments (quizzes)	6%	(every two weeks)
Tutorial participation incl. Math Assessment	6%	(every two weeks)
Laboratory	20%	(every two weeks)
Mid-term test	20%	Nov 2, 2015
Final Exam	30%	<u>Fall Final Exam period</u>
<b>Total</b>	<b>100%</b>	

**Note:** Regardless of the overall grade calculated above, an overall average of at least 35% on the mid-term test and final exam, weighted as above, must be obtained in order to pass this course. Otherwise, a grade of no more than 45% (i.e. an F) will be assigned.

## **6. Course Components**

### **6.1 Pre-class readings and quizzes**

Before each class and at the week's midway point students are assigned readings from the printed class notes (see the document *Course Schedule*, for more information about these). The quizzes must be completed before each class at noon, and also at the between-class-midway point by Friday at midnight. To do a quiz, sign on to Bb <<http://learn.trentu.ca>> and click on PHYS 1001H. From there select the appropriate reading assignment. The goal is to give an introduction to the material which 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 two lowest quiz marks will be dropped, to allow for equipment malfunctions, etc.

### **6.2 Classes**

These 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 need to register your clicker. There is a link for doing this on the Bb site. You will receive 10 clicker points for any class in which you answer at least 75% of the questions, and an additional 0.5 points 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 your total clicker mark. Missed clicker grades cannot be made up. However, your four lowest scores will be dropped before the final grade is calculated, to allow for weak batteries, equipment malfunction, etc. See the university policy on clickers below.

### **6.3 Assignments**

Roughly every two weeks a set of questions will be posted on the MasteringPhysics website, course code MPSHIELL22971. There is an initial introductory assignment to help you learn to use the Mastering Physics website, which will be counted toward your final grade. Your assignments will be graded automatically by Mastering Physics. Late assignments will automatically receive a grade of zero. Help with the assignments is available during tutorials, during physics help sessions and during office hours. Two of these problems (with slight variations) will be chosen at the following tutorial; and you will do these as a closed-book quiz. Help with the assignments is available during tutorials, physics help sessions, and office hours. The assignments are extremely important preparation for the mid-term test and final exam.

### **6.4 Tutorials**

Tutorials are held every two weeks, and alternate with the laboratory sessions. After an initial Math assessment shortly after the start of the semester, they will then consist of (i) the closed-book quiz discussed above, (ii) working through the answers to the two quiz questions, (iii) working on understanding the material on the new problem set. If you have made a reasonable attempt at all the questions you will receive full marks for completion, otherwise you will receive a zero for that session.

### **6.5 Laboratories**

Laboratory sessions are held every two weeks, alternating with tutorials. At the start of each laboratory students will answer a few quiz questions related to the purpose of that lab. They then work in groups of typically three to carry out the experiment as described in the lab manual. Individually-written lab worksheets will then be completed and submitted at the end of the lab, or at the latest by 9 am the following day. The goal of labs is to give students hands-on experience with physical concepts, an opportunity to work with laboratory instruments, and practice analyzing and presenting data.

### **6.6 Test and exams**

There will be a mid-term test on specific sections of the course material, and a final exam covering the whole course.

## **7. Late Policy**

Late policies for the non-lab components of the course are discussed in Section 6. Late lab worksheets will lose 10% per working day late without a valid excuse with 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 pro-rated to provide the laboratory grade.

## **8. Academic Integrity**

Academic Integrity Academic dishonesty, which includes plagiarism and cheating, is an extremely serious academic offence and carries penalties varying from failure 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). Please also see [http://www.trentu.ca/physics/current\\_integrity.php](http://www.trentu.ca/physics/current_integrity.php) for a discussion of plagiarism specific to the Department of Physics and Astronomy.

## **9. Clicker (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 a lecture or tutorial, possession of more than one clicker, or that of another student, may be interpreted as intent to commit an academic offence.

## **10. Access to Instruction**

Access to Instruction 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 ( BH Suite 132 , 748-1281, [accessibilityservices@trentu.ca](mailto:accessibilityservices@trentu.ca)) as soon as possible. Complete text can be found under Access to Instruction in the Academic Calendar.

## **11. Survival guide**

1 Do not be afraid to say that you don't understand: Being confused is the first step in taking control of the material because you have identified where your difficulty lies. Have someone explain it to you from a different perspective. And remember, if you are having trouble with something, other students probably are too.

2 Attend all classes: The classes are very interactive. Their main purpose is not to transfer information, which can be found in the text but instead to establish the physical connection between the equations and reality, and to develop mental models (intuition) for what is happening so that you can relate the problems to your own experience.

3 Do all assigned questions: Physics is the description of nature in the language of mathematics, and assigned problems are designed to improve your skills in this process. As with any language, the ability to use mathematics depends on practice. Studying physics primarily means doing problems not rereading the text or lecture notes.

4 Working alone and in groups: Working with other students is an excellent way to develop your understanding and analytical skills. However, it is important that in the end you can do problems on your own. Always work through your final solutions independently, using only the formula sheet as an aid. This is the only way to be sure that you really understand.

5 Show your reasoning: In your written answers, show the logic of your solutions. If you think you understand something but you can't explain it, then you probably don't really understand. Writing down your thoughts clearly can help you find mistakes and can help you sort out how to proceed when you thought you were stuck. In the end, what matters most is not the correct answer but the right reasoning.

6 Learn from your mistakes: Always find out where you went wrong on assignments and tests, and learn how to avoid the mistake in the future.

7 Focus on understanding not memorization: All the equations you will need for assignments and tests are supplied on the formula sheet. Your focus should be on understanding what these equations mean and how to use them. Think about what the symbols in each formula represent and the physical meaning of each mathematical relation. Also, it will sometimes be useful to derive new equations from the ones given.

8 Budget your time: Be aware of what each component of the course is worth and budget your time accordingly. Your time might be better spent doing extra problems, since your skill here helps with the tests and exams, worth >50% of the course marks.

9 Studying for tests and the final exam: The best way to start is to make sure that you can do all the assigned questions and problems using just the formula sheet. Extra practice problems and in particular working through previous tests and exams (available in the library) are also useful.

10 Share your ideas: If you have an idea that could improve the course, pass it on to the instructors.