

Welcome to PHYS 1060

How Things Work II Spring 2023

V2 Syllabus last updated 12/31/23

- **Course Overview:** This is a beginning physics class for non-science majors: a practical introduction to physics and science in everyday life. This course considers objects from our daily environment and focuses on their principles of operation, histories, and relationships to one another. Physics 1060 is concerned primarily with objects involving electrostatics, electromagnetism, light, electronics, and nuclear energy, but starts with a short review of Physics 1050, How Things Work I. Physics 1050 is the companion course normally taken before Physics 1060. I assume the majority have taken PHYS 1050. A satisfactory background in trigonometry and algebra is a must. No other pre-physics courses are required.
- **The instructor** for this class is Prof. Richard Lindgren (ral5q@virginia.edu). I have been a Research Professor at UVa since 1985 conducting experiments in Nuclear and Particle Physics at many different research Labs around our country including Jefferson Lab in Newport News Virginia. I also implemented and directed our REU program at UVa for many years and taught/advised/recruited teachers for the Master of Arts in Physics Education program for 10 years. This includes teaching over a hundred physics classes in person and online over this same period of time.
- **The Class:**
Phys 1060 will meet in person in Nau Hall in Room 101 on MWF from 12:00-12:50 pm. Office hours will be held on in Room XXX in BLDG. XXX on Thursdays 4-5:30 pm. Office hours can also be arranged on Zoom by appointment via email. A TA will be assigned to this class but has not been identified yet. The TA will have office hours on XXX in Room XXX in Building XXX, assists in grading exams, keep track of all grades, and be available on Piazza. There are no Discussions Sections or Labs for this class. The first day of class is Jan 18, 2023.
- **LMS:** The learning management system will be UVa Collab (also referred to as Sakai) for everything except for submission of pre-quizzes, homework, exams, and final. For the latter we will use WileyPlus (Canvas). All classes starting with the summer will transition from Collab into Canvas.
- **The Textbook and Materials:**
You need to obtain WileyPLUS Access, which includes the Online eTextbook How Things Work: the Physics of Everyday Life, 6th Edition by Louis A. Bloomfield. **The section ID is B75461.** The class is participating in the UVA Inclusive Access program, which offers

students instant online access to their course materials on the first day of class. This gives you immediate access to a digital version of the text through the Canvas site for our course. The Inclusive Access program also gives you access to the WileyPLUS online system which we will be using for homework assignments. All this is bundled into one charge to your student account. Every student has free access to the digital version of the text and the WileyPLUS platform until January ----- . After January ----- your student account will be charged.

You are not required to participate in this program. If you opt out by above deadline, your student account will not be charged. However, your access to the materials through Canvas will be removed. In that case you would need to buy the text and access to the WileyPLUS online homework portal through other means. One option is listed below

- *How Things Work: the Physics of Everyday Life* by Louis A. Bloomfield, Sixth Edition (John Wiley & Sons, Inc.). There are used and new books in the bookstore. You may also get the loose-leaf version as well.

Author / Title – ISBN – Price

BLOOMFIELD / *LL- HOW THINGS WORK W/ WILEY PLUS – 978-1-119-22871-4 - \$158.82, This option comes with the EBOOK and WILEY PLUS which contains additional resources including simulations, videos, and exercises.

The Grading: All students are assigned a letter grade for the course. Your final grade will be determined by the percentage contributions from the various components below.

- Final exam ----- 30% 1 final
- Two midterm exams-----30% 2 midterms
- Pre-Quizzes -----15% 13 quizzes (open book)
- Homework -----20% 14 homeworks (open book)
- Lecture Participation-----5% Daily question via polling

Total -----100%

Exams

Final Exam

Two midterm exams

Pre-quizzes

It is best to attend lecture having already read the textbook sections that are going to be covered in class. Student learning and retention is better in lecture when you are hearing the material for a second time. To encourage this good habit, there will be a pre-quiz containing questions covering the material for the coming week's lectures. The open book pre-quizzes for a given week will be available in WileyPLUS starting at noon on each Saturday. In getting started I will base questions on a video you will watch. The video will be a link in in the question in the

quiz. You may take the pre-quiz more than once hopefully getting a perfect score the last time you are allowed to take it. I will set the allowed times to 3. It's called a pre-quiz because it is pre to the class material I plan to cover in class. Sometimes there may be overlap as well.

Homework Assignments: There will be 14 homework assignments each consisting of usually 15 multiple choice questions consisting of several conceptual questions and problems. There will be 15 questions on each assignment. Homework assignment due dates occur at 11:59 on Friday nights and are posted on the Schedule available on Collab. Homework will be submitted on WileyPlus. You may use your textbook and discuss questions with other students, but you obviously submit your answers and type them out in your own words when required. Direct copying is an honor violation. The first homework assignment is HW01 to get you started. It will be assigned Jan 18 and it is due Jan 20 11:59 pm. You will automatically receive full credit if you submit it. Solutions to the assignments will be posted on WileyPlus after the due date.

Lecture Participation

This will include posting answers to questions in lecture through a site called PollEverywhere which allows us to interact via Q&A. Responses to questions posed during lecture will be anonymous, ie, the correctness of individual responses will not be graded. However, I have a record of who responds and these responses will form the basis of the participation portion of your grade. Each question that is answered will be worth 1 point and there will be about 30-40 opportunities throughout the semester.

Policy on make-up: No late homework will be accepted. No make-up exam will be given unless you have a valid reason not to turn in your work on time or not to participate in the exam. Valid excuses are severe or sudden illness, family illness or death, religious holiday, or University business. Please notify me of your circumstances **in advance** (or as soon as possible in case of real emergency), you will be granted an excused absence which will not affect your grade.

Attendance: Attendance will not be taken, but you may get credit by attending class and participating in polling.

Class Room Policy and Behavior: Inappropriate conduct, including reading of newspapers, surfing the internet, open laptops not used for class notes, or using your cell phone will not be tolerated in the class lecture or discussion. Cell phones must be set to silent/vibrate in the lecture hall, and certainly no cell phone conversations are allowed in the lecture hall during lecture. No personal other electronic devices such as tape recorders are to be used during lecture without the instructor's permission.

Honor Policy Statement ("pledge"): It is expected that every student in this course fully complies with all the provisions of the UVA honor system. Because of misunderstandings among students about the definition of academic fraud, I state explicitly that plagiarism is an Honor offense. Please see the Honor Committee's very straightforward discussion entitled "Fraud and the Honor

System": <http://www.virginia.edu/honor/proc/fraud.html>. In addition to pledging that you have neither received nor given aid while taking your exams, your signature also affirms that you have not accessed any notes, study outlines, problem sets, old exams, answer keys, or textbooks, during a closed-book exam. Alleged honor violations brought to my attention may be forwarded to the Honor Committee. If in my judgment it is beyond a reasonable doubt that a student has committed an honor violation with regard to an exam/homework, that student will receive an immediate grade of "F" for that exam/homework, irrespective of any subsequent action taken by the Honor Committee.

Satisfying General Education Requirements: Physics 1060 is an introductory-level physics course serving a broad range of students. It satisfies the requirements for courses in: [The Chemical, Mathematical & Physical Universe](#) category. It may also satisfy the requirements for disciplines Living Systems and Science and Society. The following excerpt is taken from the University General Education requirements in the Discipline category: A liberal education should develop in students a knowledge of past and present attempts to identify the material composition and mathematical structure of the physical world and universe and the forces that govern their interaction. Such knowledge is crucial to understanding the environment in which we live and inspiring the technologies we have developed to navigate and function in that environment. Courses in this category should introduce students to the concepts, facts, and theoretical principles of the mathematical and physical sciences and help students relate them to their lives as citizens and apply them to contemporary problems.

Students With Disabilities: Students needing the services provided by the Students Disability Access Center (SDAC) will need to be certified by that office. The center is located at 400 Brandon Ave. P.O. Box 800760, Charlottesville, VA 22908-0760, Phone 434-924-5362, Email studenthealth@virginia.edu
[Website student health](#)

Summary of Class Material

Laws of Motion

Chapters 1 include topics such as skating, coasting, scooters, running, jumping, dropping, throwing, and hitting balls and more generally acceleration of objects and associated forces and Newtons Laws and how physics affects various aspects of athletic performance. Chapter 2 deals with torque, rotational objects, angular acceleration, spinning, work and energy, etc.

Electrostatics

Chapter 10 is how electric forces affect everyday living such as doing your laundry, operating a flashlight, avoiding shocks, maintain longer life on your car battery especially when you don't use it much, and how to move water around with electrified objects, frizzy hair, and how to avoid getting your car caught on fire at the gas pump, getting killed by lightning when driving your car during an electrical storm, and how do cows standing on a hill avoid getting electrocuted.

Magnets

Chapter 11 deals with how simple magnets work and hold objects to your refrigerator, magnetic strips on credit cards, making a magnet using a wire and a single cell battery, and how to make a simple compass, household circuits and what all three prongs are for and how to avoid electrocution in your own house, and how to use a wire to make coils and a transformer to increase voltage safely.

Electromagnetism

Chapter 12 focuses on electromagnetism together and how electricity and magnetism reinforce one another to carry electricity through the air or from outer space where there is no air, and how your microwave oven works to heat up food (But can't melt ice- really).

Light

Chapter 13 deals with light and there is just so much here, let me just make a list such as: colors of light, sunsets, rainbows, color of the sky, why is the sky black on the moon, reflection, refraction, soap bubble colors, light interference, additive and subtractive colors, paints, projection of light in plays and movies, laser pointers, why are neon's signs so red, and of course lamps. How do you know what kind of light bulb to buy at Lowes, etc.? I bet you have no idea!

Cameras, Eye Glasses, CDs, etc.

Chapter 14 shows how a camera works and what are some of the buttons for, size of the lens, speed of the camera, some simple formulas, zoom lenses, how do your glasses or contact lenses improve your sight, if you are far sighted can you use your eyeglasses to start a fire on a bright sunny day, CDs, DVDs, and blu-rays which is one is best and why, optical fibers, and communication.

Atomic and Nuclear

Chapter 15. You will get to know a little about the nucleus and radioactivity and any dangers associated with natural radiation such as Virginia granite, cosmic rays, x-rays from imaging diagnostics as in the dental office or in the hospital. We discuss the production of electrical power through nuclear fission, nuclear safety controls at reactor sites, and review a few accidents that have occurred. We will also discuss medical use of intense x-rays and gamma rays including particle beams to eradicate harmful tumors. Last but unavoidable is to discuss the lethal dangers of nuclear explosions such as nuclear fission and fusion bombs.