

***PHYS 104: Fundamental Physics II***  
***Syllabus - Spring 2023***

**Location:** Life Science 307

**Instructor:** Dr. Daniel Hickox-Young (Dr. H-Y)

**Office Hours:** MWF 11:00am-12:00pm;  
TuTh 1:00-2:00pm;

**Time:** MWF 9:40-10:40am

**E-mail:** hickoxyoung@roanoke.edu

**Office:** Trexler 266A

**Phone:** (540) 375-4975

**Office Hours:** Office hours will be held in-person in Trexler 266A. If you are unavailable during office hours, feel free to stop by any time my door is open. I'm also happy to meet by appointment via zoom using the link provided below (also linked on Inquire) if you prefer. <https://roanoke-edu.zoom.us/my/hickoxyoung> Meeting ID: 848 844 3643 No Passcode is required.

To schedule an appointment, either send me an email (especially if you need to meet outside normal working hours) or use calendly (which is linked to my calendar):

<https://calendly.com/hickoxyoung>

**Course textbook:** James S. Walker, *Physics*, 5<sup>th</sup> ed., Pearson, 2016

ISBN-10: 0321976444

ISBN-13: 9780321976444

Regular homework problems will be mainly assigned from the textbook. The textbook is a valuable resource with derivations, example problems, and more. It is recommended that you read the sections associated with each lesson before class.

**Prerequisites:** PHYS 102 or PHYS 103

**Other required materials:** You will need a writing utensil and paper as well as a working scientific calculator for class sessions, assignments, and exams. You will also need a bound notebook with graph paper pages for the lab section of this class (see the lab syllabus for more details).

**Course Description:** This algebra-based course is the second part of the two-semester introductory physics sequence. This course introduces fundamental principles covering topics in electricity, magnetism, geometric and physical optics, special relativity, and modern and quantum physics.

**Learning Outcomes:** Upon successful completion of the course, students will be able to:

- Identify relevant physical principles which underlie the dynamics of real-world situations
- Manipulate units in order to relate physical models to observations of the physical world
- Construct organized physical analyses that demonstrate logically connected steps of thought
- Synthesize numerical information, physical assumptions, and scientific reasoning to describe physical systems

- Assess the validity and utility of a physical model in new contexts

**Required Laboratory Course:** You must be enrolled in the laboratory portion *PHYS 104L* of this course. Although *PHYS 104L* operates as a separate course, it counts as 25% of the course grade for *PHYS 104*. Please refer to the lab course syllabus for important information about the lab specifics and final grade. Note that if any lab experiment is not completed by the end of the semester, your course grade will be reduced by one whole letter grade. Lab does not meet during the first week of classes.

**Lecture Periods:** The lecture will cover topics outlined in the course schedule and will involve a mixture of traditional lecture, demonstrations, sample problems (worked both individually and in groups), and other activities designed to underscore the connection between course concepts and the physical world. Any question is welcomed in class at any point!

**Attendance Policy:** If you have a temperature of 100.4 or higher or other COVID symptoms, don't come to class. Call Health Services IMMEDIATELY. Do not come to class or go to any public area on campus. In order for your absence to be excused, you must give Health Services permission to notify me that you have consulted them about COVID symptoms. If Health Services informs you that you should isolate and not attend class for multiple days, inform me so that we can make a plan to keep you current in the course. All absences caused by consultation with Health Services about coronavirus symptoms or isolation ordered by Health Services will be excused but you will need to do the work and graded assignments even if we extend a deadline for you.

Formal attendance will not be taken in this class. However, I will be assessing your participation in the course based on your engagement with a variety of activities which will take place during class. You are fully responsible for the material that was covered and for any announcements made during class meetings. As with problem sets (details below), in order to receive participation credit for a class you have to be absent for, you must discuss the details with me either in person or via email at least 24 hours in advance.

**Homework:** Homework assignments will be regularly assigned, falling into two categories: (1) Textbook Problems, which are graded for completion but not for accuracy. Textbook problems will be assigned after each class, so that you can have regular practice applying concepts from class. Learning physics is a bit like learning another language, it's hard to improve without practicing the fundamentals. (2) A Critical Thinking Problem (CTP) which is graded for accuracy. One multi-part CTP will be assigned per week. 50% of your homework grade is derived from completing the textbook problems, while the other 50% comes from your grade on the CTPs.

Homework assignments are due in physical format at the beginning of class. Late homework assignments will only receive credit if discussed and approved prior to the beginning of class (with exceptions under extenuating circumstances, i.e. illness, family emergency, etc.).

**Exams:** There will be four one-hour mid-term exams and a comprehensive final exam, with their dates specified in the course schedule. Exam make-up for excused reasons (family or medical emergencies, university-recognized commitments, etc.) must be discussed and arranged with me at least one week in advance, unless it is an emergency. If your missed exam is unexcused, you will receive a zero on that exam. To limit your time commitment to this class, exams will be held in class. If you receive academic accommodations or you cannot make it to class that day, you can complete the test at a different time, but please communicate this with me ahead of time. Exams are open-book and open-notes, see more below in the Academic Integrity section. The lowest mid-term exam grade will be dropped.

**Grading:** Class grades will be calculated according to the following distribution

- ✦ Lab 25%
- ✦ Participation 5%
- ✦ Homework 30%
- ✦ Three Mid-term Exams 10% each (i.e. the 3 highest-scoring mid-term exams)
- ✦ Final Exam 10%

Furthermore, letter grades will be assigned at the end of the semester according to the following scale

A-	90-92	A	93-100			
B-	80-82	B	83- 86	B+	87-89	
C-	70-72	C	73- 76	C+	77-79	
D-	60-62	D	63- 66	D+	67-69	F <60

You should expect to spend at least 12 hours inside and outside of class each week on this course.

**MCSP Conversation Series/Extra Credit:** You are required to attend ONE talk in the MCSP Conversation Series which (schedule available at [https://www.roanoke.edu/inside/az\\_index/math\\_cs\\_and\\_physics/conversation\\_series/spring\\_2023](https://www.roanoke.edu/inside/az_index/math_cs_and_physics/conversation_series/spring_2023)) and submit a well-written reflection on the talk within one week of the presentation (with the exception of recorded talks, which can be reflected on at any time throughout the semester). The submission must present a brief summary of the key ideas of the talk and include a description of the parts of the presentation that were interesting, confusing, and relevant to this course. Your work must be grammatically-correct, typed, double-spaced, and approximately one page in length. Note that a simple summary of the talk is not sufficient to receive credit. A guided reflection form is available on Inquire to help you complete your reflection. Your reflection on the MCSP talk will contribute to your participation grade. For extra-credit, you may attend additional MCSP talks during the semester, and the submitted reflection(s) will contribute to your overall grade.

**Use of Electronic Devices:** Electronic devices are valuable tools, therefore my general policy is to allow the use of electronic devices in the classroom. Laptops or tablets may be used for notetaking during regular class sessions if this seems useful to you or even during exams if you need access to an electronic version of the textbook. Scientific calculators may be used during class when needed and during exams.

However, I expect your phones to be on silent mode and out of reach at all times, and I expect that any electronic devices will not be used to browse the internet or communicate with anyone inside or outside of class. A violation of this policy during an exam will be considered violation of Roanoke College's Academic Integrity policy, and I reserve the right to limit the use of electronic devices in the classroom if I feel this policy is being abused.

**Subject Tutoring:** located on the lower level of Fintel Library (Room 5), is open 4-9 PM, Sunday-Thursday. Subject Tutors are highly trained, current students who offer free, one-on-one (and small group) tutorials in over 80 courses taught at Roanoke College, including: Business, Economics, Mathematics, INQ 240, Modern Languages, Lab Sciences, and Social Sciences. Check out all available subjects and schedule 30- or 60-minute appointments at [www.roanoke.edu/tutoring](http://www.roanoke.edu/tutoring). If you have a question, feel free to stop by, or contact us at [subject\\_tutoring@roanoke.edu](mailto:subject_tutoring@roanoke.edu) or 540-375-2590. See you soon!

**Accessible Education Services (AES):** located in the Goode-Pasfield Center for Learning and Teaching in Fintel Library. AES provides reasonable accommodations to students with documented disabilities. To register for services, students must self-identify to AES, complete the registration process, and provide current documentation of a disability along with recommendations from the qualified specialist. Please contact Becky Harman, Assistant Director of Academic Services for Accessible Education, at 540-375-2247 or by e-mail at [aes@roanoke.edu](mailto:aes@roanoke.edu) to schedule an appointment. If you have registered with AES in the past and would like to receive academic accommodations for this semester, please contact Becky Harman at your earliest convenience to schedule an appointment and/or obtain your accommodation letter for the current semester.

**Academic Integrity:** Your learning and integrity are at the core of your RC education. For this reason, you must follow the rules outline in the College's AI policies. See [https://www.roanoke.edu/inside/a-z\\_index/academic\\_affairs/academic\\_integrity](https://www.roanoke.edu/inside/a-z_index/academic_affairs/academic_integrity). Collaboration is an important skill that you will be asked to develop in class and in lab, and I would encourage you to extend this practice beyond the classroom as you work on problem sets. However, for the CTP in particular, the final write-up should reflect your own understanding of the problem and I ask that you include the names of anyone you collaborated with when you turn in your problem set.

Exams are open-book and open-notes. All materials for this course may be consulted during an exam. This includes uploaded lectures and online versions of the textbook. Any electronic devices used during the exam should NOT be used to browse the internet. Exams in this class are an individual assessment tool, and so communication between students regarding exam content is prohibited until all students have completed the exam.

If I become aware of a possible violation of these guidelines, I am contractually obligated to report it to the Academic Integrity committee. The AI policy can be found online at: [https://www.roanoke.edu/inside/a-z\\_index/academic\\_affairs/academic\\_integrity/resources\\_for\\_students](https://www.roanoke.edu/inside/a-z_index/academic_affairs/academic_integrity/resources_for_students)

**Class Environment:** I consider this classroom to be a place where we will treat one another with respect, creating an environment that welcomes individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records.

***PHYS 104: Fundamental Physics II, Spring 2023- Daily Schedule***

The following schedule outlines the tentative timeline for the covered topics and exam dates:

<b><i>Day</i></b>	<b><i>Chapter</i></b>	<b><i>Sections</i></b>	<b><i>Topic</i></b>
18 Jan	3	3.1-3.5	Introductions + Vectors
20 Jan	19	19.1-19.5, 19.7	Electric Charge, Force, and Field
23 Jan			
25 Jan			
27 Jan	20	20.1-20.6	Electric Potential and Energy
30 Jan			
01 Feb			
03 Feb	21	21.1-21.8	Electric Current and Circuits
06 Feb			
08 Feb	<b><i>Test 1: Chapters 19-20</i></b>		
10 Feb			
13 Feb	22	22.1-22.7	Magnetic Field and Force
15 Feb			
17 Feb			
20 Feb	23	23.1- 23.6	Magnetic Flux and Induction
22 Feb			
24 Feb	25	25.1-25.3	Electromagnetic Spectrum
27 Feb	26	26.1-26.7	Geometrical Optics
01 Mar	<b><i>Test 2: Chapters 21-23</i></b>		
03 Mar			
<b>07-11 MAR – SPRING BREAK</b>			
13 Mar			
15 Mar	27	27.1-27.4	Human Eye and Microscopes
17 Mar			
20 Mar	28	28.1-28.2, 28.4-28.5	Interference and Diffraction
22 Mar			
24 Mar	31	31.1- 31.7	Atomic Physics
27 Mar	<b><i>Test 3: Chapters 25-28</i></b>		
29 Mar			
31 Mar			

03 Apr	32	32.1-32.8	Nuclear Physics
05 Apr			
07 Apr			
10 Apr	29	29.1-29.7	Relativity
12 Apr	<i>Test 4: Chapters 31, 32</i>		
<b>15 APR – GOOD FRIDAY – NO CLASS</b>			
17 Apr			
19 Apr			
21 Apr	30	30.1-30.6	Blackbody Radiation, Photoelectric Effect
24 Apr			
25 Apr			
<b>27 Apr</b>	<b>08:30-11:30</b>	<b><i>Final Exam: Chapters 19-23, 25-32</i></b>	