PHYS 103: Fundamental Physics I
Syllabus - Fall 2024

Location: Trexler 273 **Time**: MWF 10:50-11:50AM
Instructor: Dr. Fatima **E-mail**: fatima@roanoke.edu
Office: Life Science 401B **Phone**: (540) 375-2057
Student Hours: M 12:00 PM-01:00 PM & T 8:50 AM-11:50 AM
(Life Science 401B /via zoom by appointment).
Additional Hours: By Appointment

Course Description: This algebra-based course is the first part of the two-semester introductory physics sequence. During the fall semester, it introduces fundamental physical principles covering topics in classical mechanics, waves, solids and fluids, and thermodynamics

Course textbook: James S. Walker, *Physics*, 5th ed., Pearson, 2016
ISBN-10: 0321976444
ISBN-13: 9780321976444
Regular homework problems and readings will be assigned from the textbook. It is highly recommended that you read the sections associated with each lesson before class.

Prerequisites: None

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).

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 103L* of this course. Although PHYS 103L operates as a separate course, it counts as 25% of the course grade for PHYS 103. Please refer to the lab course syllabus for important information about the lab specifics and final grade.

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!

General Attendance Policy:
You are expected to attend every meeting. If you are going to be absent, I must be notified in advance. You are accountable for all work missed because of an absence. Your third and each additional absence will result in a 2-point reduction in your final course grade. You get two freebies so that I don't have to distinguish between excused and unexcused absences. College athletes will be afforded wiggle room; please come see me immediately if you are an athlete. If you should have an emergency that requires you to miss a large chunk of the course, please notify me ASAP.

Homework: Homework assignments will be assigned every two weeks roughly so that you can have practice applying concepts from class. Learning physics is a bit like learning another language, it's hard to improve without practicing the fundamentals. 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.).

Participation: Participation will include a variety of in-class activities, including problem-solving, and worksheets. The grade in this category will be based on completion of these in-class activities, as well as attendance and summaries of two MCSP Colloquium Talks.

Exams: There will be three 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, and university-recognized commitments) must be discussed and arranged with me at least one week in advance, unless it is an emergency. 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. The lowest mid-term exam grade will be dropped.

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

- Lab 25%
- Participation 15%
- Homework 25%
- Two Mid-term Exam 10% each (i.e. the 2 highest-scoring mid-term exams)
- Final Exam 15%

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/a-z_index/math_cs_and_physics/conversation_series/fall_2021) and submit a well-written reflection on the talk within one week of the presentation. 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. Your reflection on the MCSP talk will contribute to your participation 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 note-taking during regular class sessions if this seems useful to you. 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. If you have a question, feel free to stop by, or contact us at 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 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. 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 homework 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.

PHYS 103: Fundamental Physics I, Fall 2024 Daily Schedule

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

Day	***Chapter***	***Sections***	***Topic***
28 Aug	1	1.1-1.8	Introductions + brief lecture
30 Aug	2	2.1-2.7	One-Dimensional Kinematics
02 Sep			
04 Sep	3	3.1-3.6	Vectors in Physics
06 Sep			
09 Sep			(HW 1)
11 Sep	4	4.1-4.5	Two-Dimensional Kinematics
13 Sep			
16 Sep			
18 Sep	5	5.1-5.7	Newton's Laws of Motion (HW 2)
20 Sep			
23 Sep	***Test 1***		
25 Sep	6	6.1-6.3, 6.5	Applications of Newton's Laws
27 Sep			
30 Sep			(HW 3)
02 Oct	7	7.1-7.2, 7.4	Work and Kinetic Energy
04 Oct			
07 Oct	8	8.1-8.4	Potential Energy and Conservation of Energy
09 Oct			
11 Oct	9	9.1-9.7	Linear Momentum and Collisions (HW 4)
	FALL BREAK		
21 Oct			
23 Oct			
25 Oct	***Test 2***		
28 Oct	10	10.1-10.6	Rotational Kinematics and Energy
30 Oct			
01 Nov			(HW 5)
04 Nov			
06 Nov	13	13.1-13.2, 13.4-13.6	Oscillations about Equilibrium
08 Nov			
11 Nov			
13 Nov	14	14.1-14.2, 14.4-14.8	Waves and Sounds (HW 6)
15 Nov			
18 Nov	16	16.1-16.5	Temperature and Heat
20 Nov	***Test 3***		
22 Nov	17	17.1-17.3, 17.5-17.6	Ideal Gases and Kinetic Theory
25 Nov			
THANKSGIVING BREAK			
02 Dec	18	18.1-18.5, 18.8-18.9	The Laws of Thermodynamics (HW 7)
04 Dec			
06 Dec			
10 Dec	***08:30-11:30 AM (Tuesday)***	***Final Exam: Comprehensive***	