PHYS 103: Fundamental Physics I
Syllabus - Fall 2025

Location: Trexler 273   **Time**: MWF 10:50-11:50AM
Instructor: Dr. Fatima   **E-mail**: fatima@roanoke.edu
Office: Trexler 172A   **Phone**: (540) 375-2057
Student Hours: Tue 10:00 AM-12:00 PM and 1:00 -2:00PM; Wed 12:00 -1:00 PM
(Trexler 172A /via zoom 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!

Inquire (NQR):
I use the NQR environment extensively to place notes, announcements, assignments, *proofs*, *solutions*, links, and other course documents. Please do NOT forget to check NQR before you come to class or if you have a question about previous assignments.

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 0.5-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 <u>every week</u> 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. <u>Homework assignments are due in physical format at the beginning of class.</u>

Participation: <u>Participation</u> will consist mainly of attentive attendance (4 pts), in-class activities (4 pts) including collective group problem-solving, listening (and responding) to lectures, engagement in question and answer, working on in-class problems, and summary of one MCSP Colloquium Talks (2 pts).

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. <u>The lowest mid-term exam grade will be dropped.</u>

Quizzes: Quizzes will be given during class on the dates indicated. You will be given all needed equations.

Grading: Class grades will be calculated according to the following distribution
- Lab   25%
- Participation   10%
- Homework   20%
- Quiz   10%
- 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: MSCP Conversation Series reports are completed by attending one presentation in the MSCP Conversation Series. (see https://www.roanoke.edu/inside/math_cs_and_physics/conversation_series/fall_2025), and submitting a paper, which should contain: (i) a brief summary of key ideas of the talk; (ii) a description of parts of the talk that were interesting or confusing; (iii) your justified critique, including the level of presentation and the content. **The paper is due (by upload onto our course Inquire site) no later than a week after the talk**. It should be word-processed, single-spaced, approximately one page, and use proper grammar. You may not use generative AI in writing your MCSP Conversation Series Report.

Expected Hours of Work
You are expected to spend at least 12 hours per week inside and outside of class.

Policy on Late Work: For homework, I will grade an assignment with a 5% lateness deduction if turned in by 5:00PM on the due date. Following that, assignments will receive a further 5% lateness deduction for each successive school day late (with days considered to end at 5:00 PM). Once the solution has been posted in Inquire, no further assignment submissions will be accepted.

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): Accessible Education Services (AES) is located on the first floor of the Bank Building. 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 Dustin Persinger, Assistant Director of Academic Services for Accessible Education, at 540-375-2248 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 Dustin Persinger at your earliest convenience to schedule an appointment and/or obtain your accommodation letter for the current semester. The testing center, also located on the first floor of the Bank Building, can be reached at 540-375-2247.

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 2025 Daily Schedule

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

Day	Chapter	Sections	Topic
27 Aug	1	1.1-1.8	Introductions + brief lecture
29 Aug	2	2.1-2.7	One-Dimensional Kinematics
01 Sep			
03 Sep	3	3.1-3.6	Vectors in Physics
05 Sep*			
08 Sep			
10 Sep	4	4.1-4.5	Two-Dimensional Kinematics
12 Sep			
15 Sep*			
17 Sep	5	5.1-5.7	Newton's Laws of Motion
19 Sep			
22 Sep			*Test 1*
24 Sep	6	6.1-6.3, 6.5	Applications of Newton's Laws
26 Sep			
29 Sep			
01 Oct*	7	7.1-7.2, 7.4	Work and Kinetic Energy
03 Oct			
06 Oct	8	8.1-8.4	Potential Energy and Conservation of Energy
08 Oct			
10 Oct*	9	9.1-9.7	Linear Momentum and Collisions
			FALL BREAK
20 Oct			
22 Oct			
24 Oct			*Test 2*
27 Oct	10	10.1-10.6	Rotational Kinematics and Energy
29 Oct			
31 Oct			

Date	Chapter	Sections	Topic
03 Nov*			
05 Nov	13	13.1-13.2, 13.4-13.6	Oscillations about Equilibrium
07 Nov			
10 Nov			
12 Nov*	14	14.1-14.2, 14.4-14.8	Waves and Sounds
14 Nov			
17 Nov	16	16.1-16.5	Temperature and Heat
19 Nov	*Test 3*		
21 Nov	17	17.1-17.3, 17.5-17.6	Ideal Gases and Kinetic Theory
24 Nov			
THANKSGIVING BREAK			
01 Dec*	18	18.1-18.5, 18.8-18.9	The Laws of Thermodynamics
03 Dec			
05 Dec			
09 Dec (Tuesday)	*08:30-11:30 AM*	*Final Exam: Comprehensive*	

Note: Class dates marked with an asterisk will begin with a 10-15-minute quiz.

Disclaimer: Everything above is subject to change with notice and, where appropriate, your approval.