



Gen. Physics I

Physics 121

Instructor Info —



Paul Nakroshis



Office Hrs: By Appointment



Science 224



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Course Info —



Co or Pre-Req: MAT 152



Tue, Thu & Fri



Tu/Th: 0930-1045 & Fri 1230-1345



Science 165

Phy 114 Lab Info —



M-F



various



Sci C266

University of Southern Maine

Fall 2026

Overview Physics 121 is a calculus-based introductory physics course that focuses on mechanics, waves, sound, and time permitting, thermal physics. If you have not had calculus and are not concurrently taking calculus, you cannot maintain enrollment in this course. I expect you to attend class, read the textbook and most importantly, *work carefully through each homework problem assigned, or as many as possible :-).* I cannot emphasize enough the importance of struggling with each homework question, and to come and see me for help.

This is a difficult class that will require you to work hard to succeed. You should expect to spend at least 1 to 1.5 hours per day on homework & reading in this class.

Material

Required Texts

Randall D. Knight *Physics for Scientists and Engineers; 5th Edition.*

Grading Scheme

250 pts Exam 1: Friday 25 Sep 2026

250 pts Exam 2: Friday 23 Oct 2026

250 pts Exam 3: Friday 20 Nov 2026

250 pts Final Exam: Tuesday 15 Dec 08:00 — 10:00

Grades will follow the standard scale: A = 930-1000; A- = 900-929; B+ = 870-899; B = 830-869; B- = 800-829; C+ = 770-799; C = 730-769; C- = 700-729; D = 600-699; F <600.

Attendance/Participation I expect that all of you will attend class and actively participate; if you are late to class or miss a class when a test is given, you will not be given a makeup exam and will receive a zero. NO EXCEPTIONS except in documented extenuating circumstances. At the end of the semester, I will pro-rate your lowest exam score by replacing it with the average of all three hour exam scores.

Learning Objectives

- Build and demonstrate a conceptual understanding of the topics in the course.
- Be able to solve problems and explain your reasoning by appealing to the relevant physical concepts.
- Demonstrate your quantitative and qualitative understanding on exams.

Homework & the usage of Artificial Intelligence

You may know that by this point, AI has evolved to the point where it can solve every problem in our textbook. If you get stuck, there is a severe temptation to ask your favorite AI engine to solve the problem for you. I highly discourage you from doing so! The point of this course (or any college course) is to build a knowledge structure in your own brain, and to do so requires you to *struggle* with the material, make mistakes, get confused, and only then seek help from me, your LA's or other students. The struggle is a necessary part of the learning process — furthermore, using pen or pencil to work out solutions with both written explanations and mathematical reasoning is important.

FAQs

? How do I do well in this course?

! Several things come to mind: (1.) Put away all your electronic devices in class. (2.) Take detailed neatly written handwritten notes. (3.) Work as many homework problems as possible, and write detailed solutions with English (of French) explanations in a homework notebook.

? What does a *good* homework solution look like?

! Imagine you are a student at another university who is stuck on the lem and write a solution in a conversational fashion explaining—using complete sentences and figures—how to think about and work through the lem. Your homework notebook should read like your ideal homework solution manual.

? Isn't that too much work?

! It is more work than simply scribbling equations down. But learning physics means being able to think clearly and be able to explain the solution to a peer. My goal is to help you build a structure in your mind about how the physics we study works, and for you to be able to explain that understanding.

? Do I need a fancy calculator for this course?

! No. You can buy any scientific calculator, and a graphing calculator is not necessary. As with any calculator, you need to know how to use it :-)

Make-up Policy

Make-up exams will only be allowed for students who have a substantiated excuse approved by the instructor *well before the due date*. Leaving a phone message or sending an e-mail or text without confirmation is not acceptable.

Diversity and Inclusivity Statement

I consider this classroom to be a place where you will be treated with respect, and I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability - and other visible and non-visible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class.

Accommodations for Students with Disabilities

The university is committed to providing students with documented disabilities equal access to all university programs and services. If you already have approved accommodations through the USM Disability Services Center, please fill out a Semester Request Form on Accommodate to share your accommodations letter with me. If you need to request accommodations based on a disability, please submit a Student Accommodations Request through the Disability Services Center. Timely notification is essential. The Disability Services Center can be reached at 207-780-4706 or dsc-usm@maine.edu.

Academic Integrity

The University Code of Academic Integrity is central to the ideals of this course. Students are expected to be independently familiar with the Code and to recognize that their work in the course is to be their own original work that truthfully represents the time and effort applied. If you cheat on an exam, you will be given a grade of F for the course. In addition—since many of you will also concurrently enroll in the laboratory course (Physics 114), you should know that the same rules of academic integrity apply. Plagiarism is unacceptable (this includes having AI write the prose for a lab report—don't do this!) and will result in a failure for the course.

Assessment and Exam rules

Your grade for this course will be determined by your score on 3 exams & a comprehensive final exam. To do well on these exams, you will have to work through many homework problems; homework assignments are listed at the end of this syllabus.

Exams will consist of conceptual and quantitative questions (perhaps with multiple parts) where you have to show and explain your reasoning. Partial credit will obviously be awarded when possible.

You **MUST** take every exam. If you do not take an exam, it will count as a zero. No makeup exams will be given unless they are extremely extenuating circumstances or you have pre-arranged due to a conflict (forgetting that there was an exam doesn't count as an extenuating circumstance). I will, however, replace your lowest exam score with the average of your three exam scores.

You may have one letter or A4 sized paper with crib notes and you may use a scientific or graphing calculator.

(During exams no cell phones or web enabled devices may be on your person or on your desk during the exam. Smart watches must be off your wrist and in your backpack. Before taking the exam, you may take a bathroom break, but once the exam has begun, you may not leave until finished.

Class Schedule—subject to change!

Part 1: Kinematics & Newton's Laws I

Week 1	CH 1, Ch 2 Homework (Cq / E&P)	Introduction & 1D Kinematics & Vectors Ch 1: Cq: 1, 3; E&P: 19, 23, 25; : 55 Ch 2: Cq: 1, 3, 7; E&P: 1, 5, 7, 9, 21, 35, 37, 39, 49, 57, 74, 80
Week 2	Ch 3, Ch 4 Homework (Cq / E&P)	Vectors and 2D Kinematics Ch 3: Cq: 1, 3, 8; E&P: 1, 3, 5, 7, 11, 13, 19; : 25, 27, 35, 42 Ch 4: Cq: 1, 2, 4; E&P: 3, 9, 11, 13, 19, 23, 29, 35, 39, 47, 55, 83*
Week 3	Ch 4 & 5 Homework (Cq / E&P)	2D Kinematics & Force and Motion Ch 4: Cq: 1, 2, 4; E&P: 56, 59, 72 Ch 5: Cq: 1, 7 E&P: 1, 4, 13, 17, 33, 57
Week 4	Ch 6 Homework (Cq / E&P) EXAM #1	Motion along a line Ch 6: Cq: 9 E&P: 1, 3, 9, 17, 27, 31, 39, 51, 54, 57 Friday 25 Sept 12:30

Part 2: More Newton's Laws & Conservation of Laws

Week 5	Ch 7, 8 Homework (Cq / E&P)	Newton's Third Law & Motion in a plane Ch 7: Cq: 11, 12, 15 E&P: 6, 16, 17, 23, 35, 37, 45, 49 Ch 8: E&P: 5, 11, 13, 18, 25, 45, 48, 57
Week 6	Ch 9 Homework (Cq / E&P)	Work and Kinetic Energy Ch 9: E&P: 1, 3, 11, 12, 13, 14, 19, 20, 23, 43, 47, 54
Week 7	Ch 10 Homework (Cq / E&P)	Interactions and Potential Energy Ch 10: E & P: 3, 5, 9, 11, 15, 21, 27, 31, 45, 51, 70
Week 8	Ch 11 Homework (Cq / E&P) EXAM #2	Impulse and Momentum Ch 11: 1, 3, 9, 15, 19, 27, 29, 31, 41, 45, 57, 72, 82 Friday 23 Oct 12:30

Part 3: Rotational Dynamics, Gravity, Oscillations

Week 9	Ch 12 Homework (Cq / E&P)	Rotation of a rigid body Ch 12: E&P: 9, 13, 29, 31, 59, 63, 75
Week 10	Ch 13 Homework (Cq / E&P)	Newton's Theory of Gravitation Ch 13: E&P: 1, 7, 9, 15, 17, 21, 29, 33, 35, 37, 55
Week 11	Ch 15 Homework (Cq / E&P)	Oscillations Ch 15: E&P: 1, 3, 5, 7, 13, 17, 21, 27, 28, 41. 49, 55, 75, 77
Week 12	Ch 16 Homework (Cq / E&P) EXAM #3	Traveling Waves Ch 16: E&P: 1, 3, 11, 13, 19, 22, 41, 43 Friday 20 Nov 12:30

Part 4: Superposition and Thermodynamics

Week 13	Ch 17	Superposition
	Homework (Cq / E&P)	Ch 17: 5, 15, 20, 23, 41, 49, 69
Week 14	Ch 18	Superposition and Thermodynamics
	Homework (Cq / E&P)	Ch 18: 1, 3, 5, 15, 19, 23, 33, 38, 41, 47, 65
Week 15	Ch 19	Work, Heat and the First Law of Thermodynamics
	Homework (Cq / E&P)	Ch 19: 1, 3, 5, 13, 17, 21, 25, 43
	FINAL EXAM	Tuesday 15 Dec 08:00-10:00
