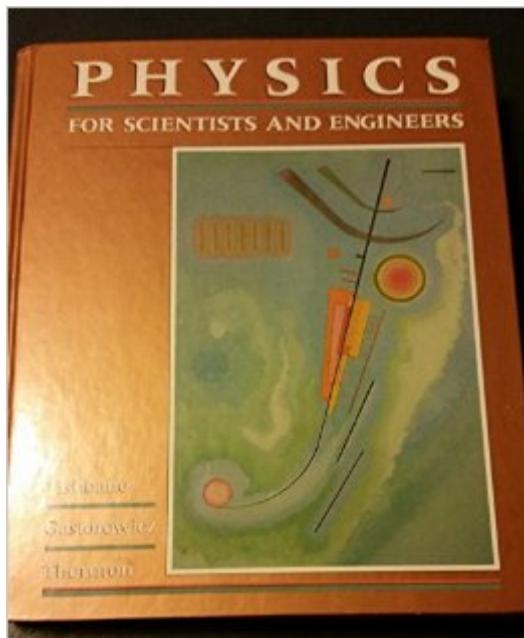


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# Physics For Scientists And Engineers



## **Synopsis**

This calculus-based introduction to physics, presents physics not as "classical" or "modern", but as macroscopic or microscopic, presenting them as they relate to specific technical and scientific issues. Principles of modern physics are integrated throughout and, when appropriate, modern physics topics are intertwined with classic principles to allow students to develop intuition for and appreciation of this material as early as possible. Calculus and other mathematical tools are self-contained and become progressively more difficult; students learn the maths as they need to know it. Optional, stand alone sections provide detailed coverage of more subtle points; offer real-world models to explain technical concepts; and set off particularly detailed derivations of important equations. Student-oriented pedagogy helps put theory into practice, with worked examples, end-of-chapter problems, problem-solving boxes, together with hints and strategies in margin notes.

## **Book Information**

Hardcover: 1240 pages

Publisher: Prentice Hall College Div; 1st edition (August 1992)

Language: English

ISBN-10: 0136632122

ISBN-13: 978-0136632122

Product Dimensions: 1.8 x 9 x 10.5 inches

Shipping Weight: 6.2 pounds

Average Customer Review: 1.9 out of 5 stars See all reviews (23 customer reviews)

Best Sellers Rank: #4,441,225 in Books (See Top 100 in Books) #49 in Books > Science & Math > Physics > Engineering #621 in Books > Science & Math > Physics > Applied #11421 in Books > Textbooks > Science & Mathematics > Physics

## **Customer Reviews**

I tutor high school students and purchase the text books their teachers are using so that I can point to chapters the students can use. A more recent version of this book was used by Naperville North HighSchool. My rating is based on the suitability of this text if used by high school teachers teaching AP Physics C. This is likely not the target use intended by the authors-- but university professors selecting books for their own needs don't need my review. As such, I am writing a review for students and parents who are currently unfamiliar with physics and are interested in a resource that might help them achieve their goals. With that in mind, when writing I bear in mind this notion: The

learning goals for those taking a course to called "AP Physics C" should be both to prepare students to pass the test and to have a foundation for higher level classes in engineering and physics bearing in mind students will get further exposure in later courses. For those purposes the text is mediocre with some positives and some negatives. My view is other available books are more suitable. That said: any book is better than no book-- which I mention only because "no book" seems to be a trend in high schools.(Note: this book is definitely not suitable for AP Physics I because AP Physics I is algebra based.)The actual review follows:On the positive side: The text does contain the necessary material to cover the syllabus for AP Physics C. For this purpose, the useful chapters are 1-13 for mechanics and 21-33 for EM. The student will be able to find examples and discussions of all relevant topics. So it is not a waste. As a general book to have on the shelf, it's also useful (though no better than other books. I'd rather have Halliday, Resnick & Walker or Young and Freedman, or the old Sears and Zemansky texts on my shelf any day. )On the neutral side: This book contains many chapters (12-21 and 34-46) that are unnecessary for AP Physics C. This feature is shared by most Calculus based physics books which are often used for a 3 semester series of required physics course. AP Physics C is the equivalent of 2 semesters. Since texts are generally written to dovetail with University needs, it unlikely a student will find a decent AP Physics text that doesn't share this feature. The only negative of the extra material is it makes the 1200+ page text ponderous and long. Those preparing for the AP Physics C course might prefer a different book for this reason. (Note: quite likely the vast majority of high school students will be assigned different text in college; those texts will cover the same material. So there is no reason to worry the students will be harmed by using a book that does not contain that material.)On the negative side: Long.The book contains copious internal digressions that are both unhelpful, unnecessary and worse, make it difficult for students to locate the material they really need to master. For example, page 101 in the (very important) section discussing application of Newton's laws rambles on about the distinction between analytical solutions and numerical solutions. This ramble is followed by a paragraph on Chaos which is then followed by a philosophical discourse on "What is a Law of Physics?" While much of this is interesting in a "Nova Science Special" or "Interesting blog post" it lessens the value of the book to students trying to learn how to understand and apply physical principles at the entry level. A chapter summary follows these digressions. Some, though not all, sub-chapters in early sections should be edited and shifted to later chapters. For the most part the ones that should be relegated to other chapters focus on modern physics. For example subchapters discussing "Barrier Tunneling in Quantum Physics" into the introduction of conservation of energy, "Momentum transfer at high energies" shoved into the introduction to conservation of momentum and "Quantization of angular

momentum" make the book a poor choice for high school teachers teaching AP Physics C. Placing a "\*" in front of the chapter to indicate it can be skipped is not the correct way to deal with the fact the material is utterly misplaced. If this book is to be used for AP Physics C (and in my view even introductory college physics) both those sections should be deferred to modern physics. While discussing misplacement of material involving modern physics: AP Physics C texts should avoid including conservation of momentum problems that aren't obviously non-relativistic before solution is attempted. So: problem 28 on page 229 involving nuclear physics and asking students to determine speed should be avoided (especially since these student may also not have taken chemistry.) Other potential homework problems sharing this issue appear in later sections of the book. Back to neutral: Sub-chapters exist in correct locations, but high school teachers should place a "\*" next to them as a reminder the material does not appear on the AP Physics C. For example: Damped harmonic motion (13.7) and Driven harmonic motion do not appear on the AP Physics C test-- and for good reason. Calculus I and II are co-requisites for these introductory physics courses, many students will not have covered the ordinary differential equations (ODEs) in any depth. Most university curricula defer topics in physics that require solutions of all but the most basic ODE's to a time when students have covered these topics in their math sequence. High schools should certainly defer these to that time as well. The reason the sub-chapter issues are "neutral" is that students who buy these books may appreciate those topics being discussed and any informed teacher can take care to highlight all sub-chapters not on the AP Physics C curriculum. She can then avoid devoting time to things like precession, electric and magnetic dipoles are not specifically addressed on an AP Physics C exam. More importantly, teachers should also avoid any and all homework problems that require understanding of application of ODE's beyond that discussed in Calculus II. Even viewed as "challenge" problems, these problems do not help students grasp concepts necessary to progress in physics and also don't help them learn to apply physics later on.----I am adding this because I can't help myself: I mostly avoided reading the sections that are not on the AP Physics C. But I couldn't help examining the section on fluid mechanics. Figure 16-31 claiming to illustrate "Poisuille Flow" is pathologically incorrect. The velocity profile does not come to a "point" in the center of the pipe. I hope this is corrected in later versions. This will not harm students in an AP Physics C course because the chapter will be skipped entirely.

Regardless of what the engineering undergrads say, this textbook is great. Previously an engineering undergrad myself - turned physics, this is by far the best physics textbook I've come in contact with. Higher physics textbooks are usually very dry, but this book makes entry level physics

fun to learn. The reason all of the engineering undergrads have a problem with this book is because they are used to plugging numbers into equations. If you seek to get an actual UNDERSTANDING of the concepts and wish to brush up on your calculus, this is an excellent book for you. If you don't, I wouldn't recommend this or any other physics textbook.

I had the author of this book as my professor for Physics. We used this textbook and it was just really, a waste of our money. The textbook did nothing to help us learn physics in any way at all. It just confuses you more when the author takes the most complicated path to teach you a concept when it could be explained so much simpler. I had already taken a college-level physics class before this, and there are so many other better textbooks out there than this one. I have to say that they do have colorful and detailed illustrations which sometimes help, but the wording needs much help.

I entered engineering at the University of Cincinnati with little or no knowledge of physics. Through the use of this book I feel I now know less than before. I think this book acts as a Black Hole, because it lacks so much it has to pull the knowledge from its readers. I do not recommend this book.

I read physics and higher order math books and I had taken a college physics class before that covered all the same material with a different textbook. I then changed my major and had to take a physics class which unfortunately used this book. I am thankful that I all ready new the concepts from my other textbook, because this book explaines what I thought were simple concepts in the most convoluted and obscure manner. If I did not have my other textbook I don't know how I would have understood the concepts covered in an applicable manner. There is not enough examples in the text and when they do give examples they are not even comparable in difficulty level to the homework questions. This book also has poor organization as far as topics covered in the text. For example, the uniform dynamic circular motion topics should be in one chapter not smattered throughout several, and everytime the book refers to a figure it is always on the other page. This last critism may sound kind of petty, but when your reading this book four hours a day it slows things down when you keep having to locate the figure the text is reffering to.

Words cannot express the disdain I have toward this book. I was forced to use this "book" (if you can call it that) during my freshman year at the University of Minnesota, and at the end of the

semester, I was thoroughly confused about a subject that I previously considered myself very knowledgeable. I recommend that this book no longer be printed, that it no longer befuddle the minds of otherwise promising young scientists and engineers. Full of confusing and irrelevant derivations, this book does not accomplish its goal of developing the minds of young students, but rather it hinders development in an amazingly bad way. Instructors, please do not make the mistake of using this text to "teach" your students. Show them that you care about the quality of their education. Thank you.

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