



Course of Theoretical Physics: Vol. 1, Mechanics

L.D. Landau, E.M. Lifshitz

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Devoted to the foundation of mechanics, namely classical Newtonian mechanics, the subject is based mainly on Galileo's principle of relativity and Hamilton's principle of least action. The exposition is simple and leads to the most complete direct means of solving problems in mechanics.

The final sections on adiabatic invariants have been revised and augmented. In addition a short biography of L D Landau has been inserted.

Course of Theoretical Physics: Vol. 1, Mechanics Details

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Angian says

Una formulazione matematico-deduttiva della meccanica classica. Un testo molto popolare tra i fisici, dicono.

L'apprezzamento di un libro del genere non può che dipendere fortemente dal background del lettore. Io sono ingegnere delle telecomunicazioni (pure un po' arrugginito), quindi in una posizione intermedia tra il pubblico ideale (matematici e fisici) e un profano assoluto. Mi ci sono avvicinato con scarso ottimismo, mettendo in conto di dover abbandonare il testo per inadeguatezza manifesta della mia preparazione.

Il primo capitolo è stato una piacevole rivelazione: la derivazione delle leggi della meccanica dalla definizione di lagrangiana e dal principio di minima azione di Hamilton. Niente di nuovo, immagino, per chi abbia studiato Meccanica Razionale (noi ingegneri dell'informazione ne siamo stati privati, e a questo punto me ne rammarico, senza ironia). L'esposizione è concisa ma efficace, il formalismo elegante. L'approccio, valido un po' per tutti i capitoli, è il seguente: alla formulazione generale segue la declinazione di alcuni casi specifici, via via più complicati.

Sono riuscito a seguire bene fino poco dopo la metà del libro. Poi ho perso un po' il filo, non sapevo più quali erano le variabili indipendenti nelle innumerevoli equazioni alle derivate parziali... L'introduzione dei tensori nel trattamento del corpo rigido mi ha dato il colpo di grazia. Di nuovo, immagino che ad es. per un ingegnere strutturista queste cose siano il pane quotidiano, per me era tutto nuovo, e il testo è a tratti *troppo* conciso.

A chi abbia un background simile al mio, consiglio senz'altro la lettura, per tornare a percepire la potenza dell'approccio analitico, respirare l'aura quasi sacrale di una materia senza tempo.

Ronald Lett says

The definitive work on the Lagrangian and Hamiltonian formulation of mechanics. Be wary that you should have a working knowledge of differential geometry or a mastery of analytic geometry as it will be fully applied to physical problems. It is also very dense, but very well written. By density, one means that a typical sentence contains the information that an entire chapter in an undergraduate text would spend time expounding. It is up to the mature reader to motivate any necessary expansion of the material presented in the text.

Anthomansland says

One of the most elegant, concise, precise, and powerful presentation of classical mechanics. Not a single word or drawing is wasted. Landau's presentation is logical and clear, if a bit fast ; this is not a book you can read without putting serious effort in it.

The genius of the book is the emphasis on the well-known concepts with the principle of least action. Kepler's law, Newton's law, and many other are directly derived from it. The formalism of classical mechanics is shown in all its force.

Of course, the book lacks practical example and situations ; but I'd say that it serves it, as the express intention is to give the most "pure" presentation possible.

dead letter office says

there are no wasted words in this book, which makes it easily the most elegant presentation of classical mechanics i've ever seen. simultaneously a pleasure to read (when you see what's going on) and difficult to understand (when you don't). the starting point is the principle of least action, and newton's laws are only given as an afterthought.

it's hard to overstate the beauty of this text.

this is the first volume of the 10 volume landau/lifshitz course on physics, and by far my favorite of the ones i've used.

Doya says

still best.

Risto Saarela says

via <https://news.ycombinator.com/item?id=...>

DJ says

I read about half of this but realized it's not exactly the greatest introductory text to classical mechanics.

Landau seems to have attained god-like status among many physicists for his "great books," but these are really only great in retrospect, as unifiers of concepts once you've learned them elsewhere. His books generally lack motivation or links to natural phenomena. That said, if you're looking for an introduction to any topics in physics, avoid Landau.

Kevin Nuckolls says

A concise, pointed review of classical mechanics. Every word, every equation, every comment in this text as meaningful and necessary.

Ryan says

This book takes a large textbook on Advanced mechanics ie Goldstein and condenses it into the size of a short story paper back. I enjoyed this book but be ready to spend a lot of time figuring out how to get from one page to the next. As Landau says "After a few simple substitutions" which turns out to be about three pages of integrals. Good Luck!!!

Rahul Munshi says

From word one, these guys meant business. Great book.

Bojan Tunguz says

One of the most significant moments in my Physics education came during my sophomore year in college. I decided to pick up a copy of "Mechanics" by Landau and Lifshitz that was on reserve in the library for the mechanics class that I was taking. This is the first volume in the internationally renowned series of textbooks on theoretical Physics, the series that has a reputation for its sparse and difficult writing style, as well as the undoubtedly difficulty and brilliance of the material presented. This is probably the reason why until that point I didn't even bother looking at these books, but for whatever reason that fateful night I decided to take a look at this particular volume. To my surprise, the book was actually pretty readable and the first few chapters revealed an entirely new way of looking at Physics. Until that point I was used to thinking about Physics as a set of laws and equations, relatively succinct but otherwise somewhat arbitrary and ad-hoc. Landau and Lifshitz's book started from a very different point; it gave some deep underlying principles as a starting point behind the development of physical laws and equations. Based on that I had a new and deeper appreciation of my chosen field of study, and I gained a whole new way of looking at the physical reality.

Granted, the book is really not a walk in the park. Many later chapters can be rather technically demanding, and a prior course on theoretical mechanics at college level is probably the minimal level of preparation that can get a reader through the whole text. There aren't all that many examples that are thoroughly worked out, but all of the problems are given (rather concise) solutions - you still need to fill in some of the more important steps on your own. Mechanics is not an area of active modern research, so this is not necessarily a book that will help one with their scientific careers. However, it provides a solid grounding in some of the most basic physical concepts, and the skills and techniques acquired here can be very important in other areas of Physics. All said, this is a classic textbook that anyone who is serious about a career in Physics would be well advised to go through.

Rich Bergmann says

THE definitive treatment of Mechanics by one of the best mathematical physicists that ever lived.

Paolo says

A classic concise exposure of the principles of theoretical physics from the mechanics on.
The genius of Lev in these pages.

Hollis says

A great book on classical mechanics but it must be emphasized that the Landau-Lifschitz books are generally intended for advanced students who already have some knowledge of the subject in question. Their book on fluid mechanics is really an advanced textbook in the subject, for example, with many results not found elsewhere in the field. The popularity and renown of the books amongst students is actually quite misleading in that respect, as none of them are really introductory,

Wetdryvac Wetdryvac says

This is the perfect example of why suffering any form of brain trauma is a bad plan. Once upon a time, I could *almost* keep up with this series. Now... I can sometimes almost remember what keeping up with this was like. When I was able to keep up, it was awesome. It's still awesome from a layman's perspective, but I have to spend ages running the numbers now, instead of, "This makes sense," And just know I'm good to go.

Grr. Yay. And more yay, since I actually sat down to re-read some and more or less kept up without having my brain squirm.
