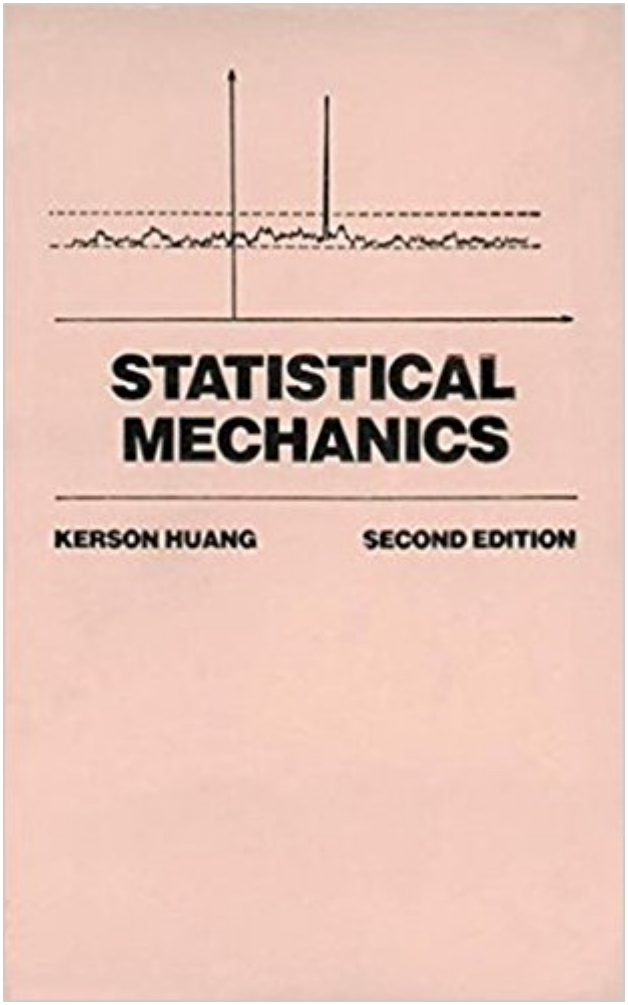
Statistical Mechanics, 2nd Edition



Synopsis

Unlike most other texts on the subject, this clear, concise introduction to the theory of microscopic bodies treats the modern theory of critical phenomena. Provides up-to-date coverage of recent major advances, including a self-contained description of thermodynamics and the classical kinetic theory of gases, interesting applications such as superfluids and the quantum Hall effect, several current research applications, The last three chapters are devoted to the Landau-Wilson approach to critical phenomena. Many new problems and illustrations have been added to this edition.

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Customer Reviews

no problem EXCELLENT book

In my 18 years of formal education, this is the worst textbook I have ever used in any subject. His writing style is awful, the book is littered with typos, his notation is completely different from any I've ever seen, and attempting the homework problems is similar to trying to write an essay in Korean with only a travel guidebook as a reference. Even the paper and cover is of substandard quality. If you are an instructor and are reading this, for the love of god, DON'T USE THIS FOR YOUR COURSE.

I learned statistical mechanics from `Statistical Mechanics' by K. Huang and `Statistical Mechanics' by S.K. Ma. In my opinion, most books on the elementray principles, including the book by K. Huang, are too complicated for beginners. The best treatments as far as I know are given by

`Statistical Physics, part I' by Landau and Lifshize and the one by S.K. Ma. Another weak points in Huang's book are the discussions about ideal quantum gases. It presents formal mathematical methods to study this problem. I think that this approach is also too complicated for beginners and sometimes bury the relevant physical ideas. In this part, the best treatment for the ideal Bose gas is given by `Statistical mechanics' by T.D. Lee (in Chinese), and for the ideal Fermi gas given by S.K. Ma.For these parts, I should give 3 stars. However, the strong parts of Huang's book is the chapters on the advanced topics. The writting is compact and clear. They can be served as a good introduction to the modern theory of critical phenomena and superfluidity. Further, they are useful references for research. In addition, the formal manipulation for quantum ideal gases is necessary for research though it seems a little bit complicated for students. For all these, I gave 4 stars to this book.Finally, I should say that the approach of Huang's book is not based on the kinetic theory though it spends a few chapters on this aspect. The reason why the kinetic theory is put before the chapters on SM, in my opinion, is to emphasize the important role played by collisions between particles to establish thermal equilibrium and the validity of the basic assumption of SM, as indicated by S.K. Ma in his book. I think previous reviews about this are misleading.

I just completed a class taught from Huang. It was rocky. If this is your first time through a serious stat mech class, you have difficulty with thermodynamics, or you are the sort of person that learns by doing, then this probably isn't the book for you.That being said, if you have a strong background in stat mech and thermo, you'll probably find Huang quite enlightening. Huang's approach isn't the most pedagogically sound, but he is more insightful than most. (In the sense of what he presents, not necessarily how he presents it.)Additionally, while there are errors in the book, there aren't so many that it makes it unreadable -- the book is hard to read based on its own construction.I managed to do well in the course, but it was by constantly referencing other books. If this is your first time through, I recommend reading the material of the current chapter in another book first, running a couple of example problems from that book, and then reading through Huang. It seemed to work better as a reference into usually uncovered topics than as a textbook. The first few chapters on thermodynamics and (non-quantum) statistical mechanics are probably best learned from another source.

this is a standard book on statistical mechanics. Admittedly, this is not an easy book, but if youare seriously about leaning statistical mechanics, then this is a serious book for you.

Few books on Statistical Mechanics present a treatment with a grounding in the Boltzmann Transport Equation. It is more usual the case that a statistical approach is adopted, in which the canonical (or other) ensemble is arrived, and subsequent results somehow refer back to the the ensembles. Huang seems to wish to proceed from a strongly microscopic and kinetic point of view. There must be great strength in his approach, as statistical phenomena, in reality, is built up from this semi-classical sort of physics. If you like kinetic theory, then buy it. However, for those of us who find more comfort in relating to a more statistical approach, this book is fearsomely unreadable.But do read it for a description of the Boltzmann Transport equation.

It might or might not be a good idea to use this book as a textbook for a course of statistical mechanics. However, it contains some material which is difficult to find elsewhere. First of all, there is a very nice exposition of Lars Onsager's own solution of the 2D Ising model which I found easy to follow. The book also contains a nice illustration of renormalization ideas with the 1D Ising model. The first edition of the book appeared in 1960-es and contained some new pedagogical ideas which appealed to many physicists. The book was almost immediately translated into Russian which emphasizes its significance.

I am appaled and even outraged to read so many negative criticisms of this fine book. If it is included in many graduate courses in statistical mechanics is because the experts believe it is good. I share this belief and many (many!) of my colleages think also do. Admitedly, it is a hard book and not so good for self study, but it is great as a companion to an advanced statistical mechanics course, or for teachers. Ah, the log(N!) thing (Stirling's approximation) is quite obviously a typo, and eq. (4.39) has a wrong ! as is trivial to check. Errata like this are really hard to avoid, I have found them in many other books, but this one is not of the worst (e.g. Tinkham's Superconductivity was much worse).

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