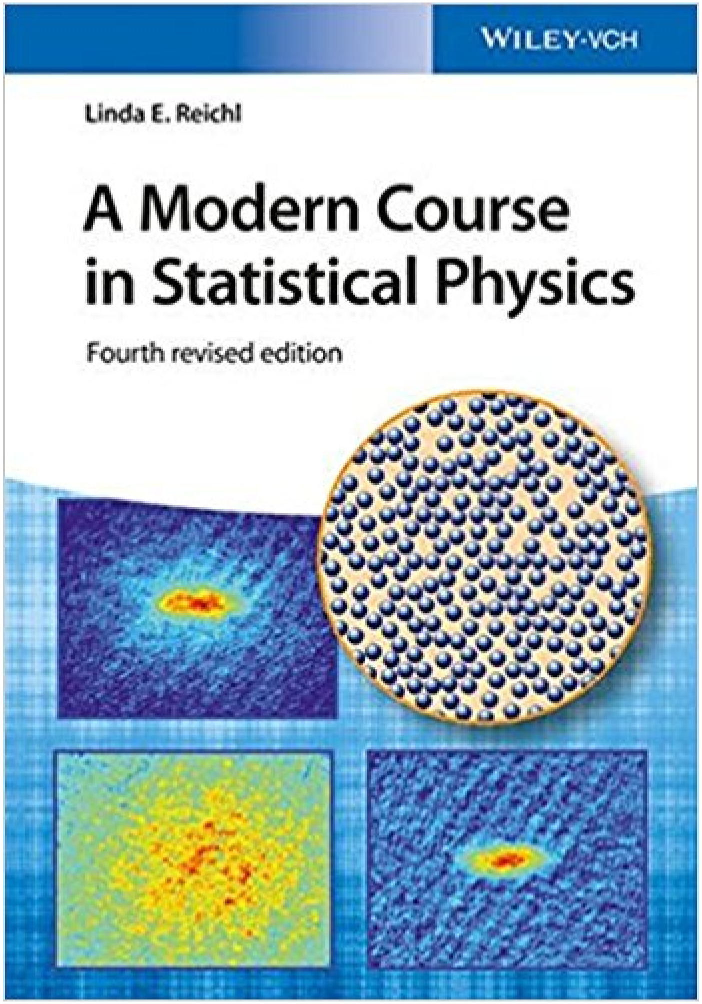
A Modern Course In Statistical Physics



Synopsis

A Modern Course in Statistical Physics is a textbook that illustrates the foundations of equilibrium and non-equilibrium statistical physics, and the universal nature of thermodynamic processes, from the point of view of contemporary research problems. The book treats such diverse topics as the microscopic theory of critical phenomena, superfluid dynamics, quantum conductance, light scattering, transport processes, and dissipative structures, all in the framework of the foundations of statistical physics and thermodynamics. It shows the quantum origins of problems in classical statistical physics. One focus of the book is fluctuations that occur due to the discrete nature of matter, a topic of growing importance for nanometer scale physics and biophysics. Another focus concerns classical and quantum phase transitions, in both monatomic and mixed particle systems. This fourth edition extends the range of topics considered to include, for example, entropic forces, electrochemical processes in biological systems and batteries, adsorption processes in biological systems, diamagnetism, the theory of Bose-Einstein condensation, memory effects in Brownian motion, the hydrodynamics of binary mixtures. A set of exercises and problems is to be found at the end of each chapter and, in addition, solutions to a subset of the problems is provided. The appendices cover Exact Differentials, Ergodicity, Number Representation, Scattering Theory, and also a short course on Probability.

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Customer Reviews

"This fourth edition extends the range of topics considered to include, for example, entropic forces, electrochemical processes in biological systems and batteries, adsorption processes in biological systems, diamagnetism, the theory of Bose-Einstein condensation, memory effects in Brownian motion, the hydronamics of binary mixtures." (Zentralblatt MATH 1334 2016)

A Modern Course in Statistical Physics is a textbook that provides a grounding in the foundations of equilibrium and nonequilibrium statistical physics, and focuses on the universal nature of thermodynamic processes. It illustrates fundamental concepts with examples from contemporary research problems. One focus of the book is fluctuations that occur due to the discrete nature of matter, a topic of growing importance for nanometer scale physics and biophysics. Another focus concerns classical and quantum phase transitions, in both monatomic and mixed particle systems. The book treats such diverse topics as osmosis, steam engines, superfluids, Bose-Einstein condensates, quantum conductance, light scattering, transport processes, and dissipative structures, all in the framework of the foundations of statistical physics and thermodynamics. All classical physics is derived as limiting cases of quantum statistical physics. This revised and updated third edition gives comprehensive coverage of numerous core topics and special applications, allowing professors flexibility in designing individualized courses. The inclusion of advanced topics and extensive references makes this an invaluable resource for researchers as well as students Ã¢â ¬â œ a textbook that will be kept on the shelf long after the course is completed. From the contents: Complexity and Entropy Thermodynamics The Thermodynamics of Phase Transitions Equilibrium Statistical Mechanics I: Canonical Ensemble Equilibrium StatisticalÃ Â Mechancis II: Grand Canonical Ensemble Brownian Motion and Fluctuation - Dissipation Hydrodynamics Transport Coefficients Nonequilibrium Phase TransitionsÃ Â --This text refers to an alternate Paperback edition.

The best book on Statistical Physics and (also) in stochastic processes.

Let me state that the second edition of this book is one of my favourite statistical physics textbooks. In fact, I think it is the best book to use in an introductory statistical physics course.This edition is still very good. Everything is very well explained, it is a pleasure to teach from, and the problems are excellent (they are self-contained, in the sense that they can be solved by reading the chapter, which is not always the case for other advanced textbooks). The choice of topics is also very good. This edition has an introductory chapter on entropy/states/multiplicity, which includes worked examples of different, but simple systems to demonstrate the concept.The chapter on thermodynamics is also a strength of this book. It is very clear, and lays a great foundation (I think this is done even better in the previous edition, of course, I understand why it had to be shortened).I also particularly liked that the part on renormalisation group theory introduces the topic by first discussing homogeneous functions, then scaling, and then goes to RG. And, again, it is done in a very clear way.I was a little surprised that the Liouville theorem, which is very basic to statistical mechanics, was demoted to an appendix rather than the main text.

Firstly, let me begin by saying that the 2nd edition of this book is much better than the current one. Even the 2nd edition has many of the flaws shared by this one but it’s a lot more comprehensive and clear. And there are several sections in that book which are not covered at all/in minimal detail in this edition, the 3rd one.Now, there are some good features in this book. In particular, this book has a pretty solid discussion of thermodynamics. This may not be a very "exciting" or "new" topic but quite a useful one especially in biological and chemical systems. And then, the section on Brownian motion and Fluctuation-Dissipation is one of the better ones to be found in an introductory graduate text. The same goes for the discussion of transport theory, which was slightly better in the 2nd edition.The flaws are mainly two-fold. The first is the matter of an extremely confusing notation where the same symbols are repeated for very different physical quantities or sometimes the notation used is unnecessarily complex. The second problem lies in the fact that the core of introductory stats mechanics: the canonical and grand canonical ensemble are not covered in good enough detail. The non-equilibrium phase transitions are also not given the level of importance that they deserve.I’d probably have given 4 stars for the second edition and 3.5 for the third one. It is a good book for some topics but beware of the notation and the rather high number of incomplete derivations.

I used this textbook for a Graduate Statistical Mechanics course at Rutgers University.The Bad - terrible to learn concepts from for the first time. Makes almost no attempt to help develop intuitive feel for the concepts at hand. Problems and equations are presented with very little motivation or connection to the subject as whole. Derivations show sparse amount of steps, but with little explanation of how to get from one point to the other. - Typos?? This book has a surprising amount of errors in it, most problematically in the equations themselves.The good - Covers ALOT of material that the others (Pathria, Reif) don’t get near such as Renormalization Groups and pretty much every single Special Topics sections at the end of the chapters. Although I found very little use for this textbook while taking the course (Landau & Pathria were the main books I looked to) I am glad to have it for my bookshelf since it seems to offer a lot of interesting reference on the more advanced subjects.

I found this book to be clumsy in its notation and sloppy in its delivery. The information presented in the book is more than comprehensive, however. Each chapter ends with a "special topics" section that covers new and old ideas in the field. Yet the book manages to fall short with its organization and presentation. When new concepts are introduced, very little background is given, and steps in calculations are often bypassed. There are many examples to follow, but even the examples seem pointless when the next step in the derivation has been skipped and it takes the reader several minutes to find the connection. In addition, the book is a somewhat poor reference in the way that many chapters cannot stand alone, due to the quirky notation that is scattered all over the book. If one is not familiar with this notation, then if one wishes to reference the book, he or she will have to waste time finding out why the author uses a capital N there and a small n here, a "mu prime" there and a "mu" here, or a vector k there and an apparently scalar k here.In summary, the book is comprehensive, covering a wide range of ideas both new and old, but it fails in the fact that it cannot present the information in a clear manner.

This book does cover a range of topics with an emphasis more relevant to current and recent physical research than many other texts, and is generally well presented and explained. I turn to it along with Reif's Statistical Mechanics as standard references. I particularly liked the extensive discussion of probability theory and stochastic processes and their relevance to physics in Chapters 5 and 6. But this discussion is somewhat flawed in its mathematical details, particularly in connection with Markov chains. Actually this reflected my experience with the book as a whole -- a great collection of topics explained well in general, but not always when read in detail.

Second Grade: John Thompson’s Modern Course Compiled and edited by Philip Low, Sonya Schumann & Charmaine Siagian (John Thompson’s Modern Course Piano) Classical Piano Solos - Third Grade: John Thompson’s Modern Course Compiled and edited by Philip Low, Sonya Schumann & Charmaine Siagian (John Thompson’s Modern Course for Piano) Classical Piano Solos - First Grade: John Thompson’s Modern Course Compiled and edited by Philip Low, Sonya Schumann & Charmaine Siagian (John Thompson’s Modern Course for the Piano) The Solid State: An Introduction to the Physics of Crystals for Students of Physics, Materials Science, and Engineering (Oxford Physics Series) Head First Physics: A learner’s companion to mechanics and practical physics (AP Physics B - Advanced Placement) Physics for Kids : Electricity and Magnetism - Physics 7th Grade | Children’s Physics Books Six Ideas that Shaped Physics: Unit N - Laws of Physics are Universal (WCB Physics) Quantum Electrodynamics: Gribov Lectures on Theoretical Physics (Cambridge Monographs on Particle Physics, Nuclear Physics and Cosmology) Six Ideas That Shaped Physics: Unit R - Laws of Physics are Frame-Independent (WCB Physics) Problem-Solving Exercises in Physics: The High School Physics Program (Prentice Hall Conceptual Physics Workbook) From Special Relativity to Feynman Diagrams: A Course in Theoretical Particle Physics for Beginners (UNITEXT for Physics)