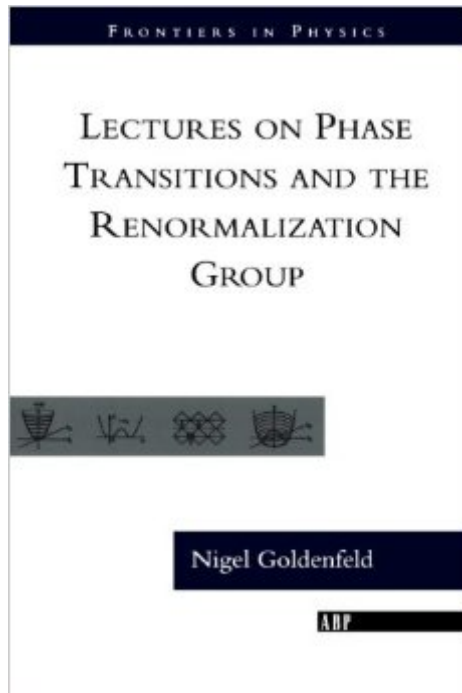


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# Lectures On Phase Transitions And The Renormalization Group (Frontiers In Physics)



## Synopsis

Covering the elementary aspects of the physics of phases transitions and the renormalization group, this popular book is widely used both for core graduate statistical mechanics courses as well as for more specialized courses. Emphasizing understanding and clarity rather than technical manipulation, these lectures de-mystify the subject and show precisely "how things work." Goldenfeld keeps in mind a reader who wants to understand why things are done, what the results are, and what in principle can go wrong. The book reaches both experimentalists and theorists, students and even active researchers, and assumes only a prior knowledge of statistical mechanics at the introductory graduate level. Advanced, never-before-printed topics on the applications of renormalization group far from equilibrium and to partial differential equations add to the uniqueness of this book.

## Book Information

Series: Frontiers in Physics (Book 85)

Paperback: 394 pages

Publisher: Addison-Wesley (July 21, 1992)

Language: English

ISBN-10: 0201554097

ISBN-13: 978-0201554090

Product Dimensions: 6 x 1 x 9 inches

Shipping Weight: 1.6 pounds (View shipping rates and policies)

Average Customer Review: 4.7 out of 5 stars [See all reviews](#) (9 customer reviews)

Best Sellers Rank: #480,971 in Books (See Top 100 in Books) #72 in [Books > Science & Math > Physics > Nuclear Physics > Particle Physics](#) #1297 in [Books > Textbooks > Science & Mathematics > Physics](#)

## Customer Reviews

This book stands clearly to me as the best one on the vast and fascinating subject of phase transitions, critical phenomena and the renormalization group. My other references are Binney et al., Le Bellac and Yeomans. Nigel Goldenfeld's course is the most suitable for a first contact with the field. It stresses in an exceptional way the ideas lying under each concept and has a gift for explaining what's really going on beyond the equations. This can most clearly be seen with his careful discussion of ergodicity and symmetry breaking. Moreover, this book is remarkable in that it presents various openings on modern issues ; it includes an overview of disordered systems and a

rather complete discussion of dynamical critical phenomena. After reading this book, you'll probably be ready to fully appreciate the typical treatises on critical phenomena, which use more sharp technical tools but which require a good understanding of the associated physics you'll only find so beautifully presented in Nigel Goldenfeld's book.

Nigel Goldenfeld's book, "Lectures on Phase Transitions and the Renormalization Group" is clear, lucid, and very well-written. One of the most challenging things in writing such a book (I won't call it a text; but it serves well for that purpose) is in helping the reader to gain conceptual insight into the subjects, and not to simply to present a series of equations. In this, Dr. Goldenfeld succeeds admirably. Topics that Goldenfeld discusses (most significantly; the renormalization group concept and critical phenomena) are presented in a very clear and accessible manner. In fact, his book is so useful that I have adopted his reference as my own "standard nomenclature," and have translated my previously-used notation (and also studied in such classic's as Hill's "Statistical Mechanics") to agree with Goldenfeld's. One of the aspects that I am particularly enjoying is the care with which Goldenfeld builds the underlying logic and arguments as he approaches key points. This is very well-done, and makes this book a solid "go-to" reference in developing a well-grounded understanding of emerging yet very important topics.

Professor Goldenfeld's stated purpose of writing "...simply and clearly why phase transitions exist .." and also "...to avoid technicalities which hide the crux of the matter..." has been beautifully fulfilled. A student of the subject will find here excellent discussions pertaining to Dimensional Analysis, Ising Model, Lattice Gas Model, Correlation Functions, Transfer Matrices, Mean Field Theory and a nice Introductory on Functional Integrals. The Exercises, in many cases, include hints /steps to prod the student. The physical discussions are lucid and pedagogic. Mathematical derivations are presented in a fashion which can not be made clearer and can be easily followed with paper and pencil in hand (I trust that even in the age of computers certain routine computations/manipulations need to be actively assailed by the student). Particular mention goes to the fine discussion of Similarity Solutions and renormalisation in a general setting, as presented in Chapter Ten. However, it is particularly difficult to single out any chapter above all others, as the entire text is a model of lucidity-- and, if this is not an example of a Physics "Classic", then I am at a loss as to the definition of that term. This text gives one the impression of sitting-in on the Professor's Lectures and feeling elated with the experience. Highly Recommended.

This book was something I used to study Renormalization in my course in both undergrad and grad school. It is a classic, and I appreciated it far more after sitting through Nigel's lectures on the same in class. Well written, well thought out and very pedagogical. Highly recommended.

This is an excellent textbook for anyone who wants to learn how phase transition happens and the renormalization group. I think this will be the best introductory book if you want to learn about RG in the statistical mechanics context.

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