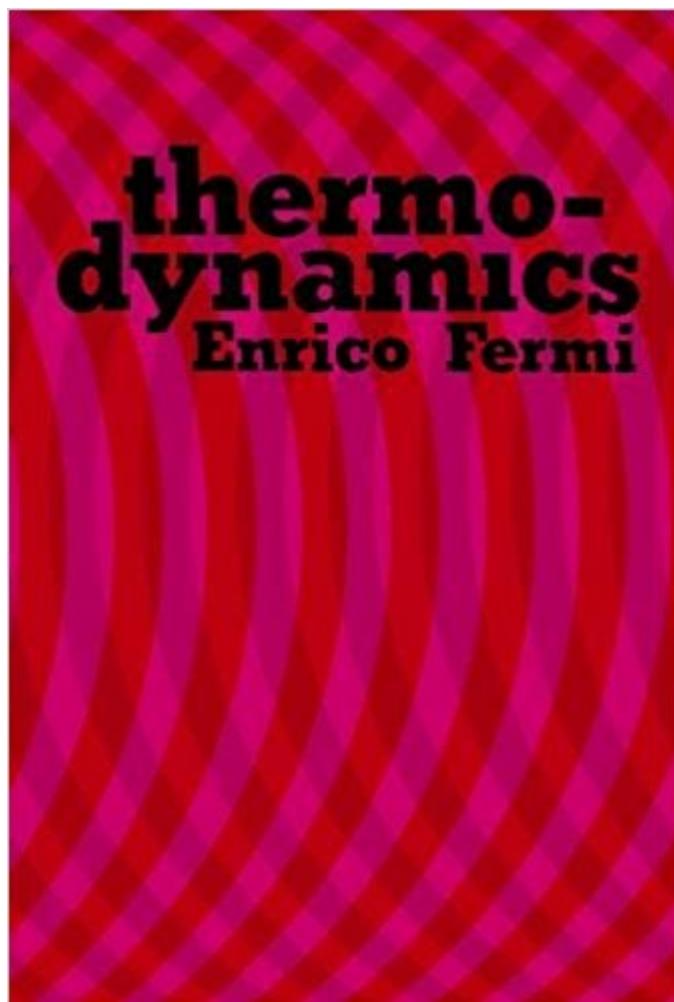


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# Thermodynamics (Dover Books On Physics)



## Synopsis

Indisputably, this is a modern classic of science. Based on a course of lectures delivered by the author at Columbia University, the text is elementary in treatment and remarkable for its clarity and organization. Although it is assumed that the reader is familiar with the fundamental facts of thermometry and calorimetry, no advanced mathematics beyond calculus is assumed. Partial contents: thermodynamic systems, the first law of thermodynamics (application, adiabatic transformations), the second law of thermodynamics (Carnot cycle, absolute thermodynamic temperature, thermal engines), the entropy (properties of cycles, entropy of a system whose states can be represented on a (V, p) diagram, Clapeyron and Van der Waals equations), thermodynamic potentials (free energy, thermodynamic potential at constant pressure, the phase rule, thermodynamics of the reversible electric cell), gaseous reactions (chemical equilibria in gases, Van't Hoff reaction box, another proof of the equation of gaseous equilibria, principle of Le Chatelier), the thermodynamics of dilute solutions (osmotic pressure, chemical equilibria in solutions, the distribution of a solute between 2 phases vapor pressure, boiling and freezing points), the entropy constant (Nernst's theorem, thermal ionization of a gas, thermionic effect, etc.).

## Book Information

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## Customer Reviews

Enrico Fermi: Father of the Atomic Age Enrico Fermi (1901–1954) received the 1938 Nobel Prize in Physics "for his demonstrations of new radioactive elements produced by neutron irradiation, and for his related discovery of nuclear reactions brought about by slow neutrons." Just a

year before winning the Nobel Prize, Fermi published *Thermodynamics*, based on a course of lectures at Columbia University, an enduring work which Dover first reprinted in 1956 and which has been in print continuously since then, one of the foundations of Dover's physics program. Both a theorist and an experimentalist, Fermi packed an immense amount of science into his relatively short life, which ended prematurely as a consequence of the radiation he received working on the development of the atomic bomb. His work, of course, was not just in the realm of nuclear physics: Fermi will always be the most remembered for the events of December 2, 1942, when he and other scientists at the University of Chicago's Stagg Field produced the world's "first self-sustaining chain reaction . . . instituting the controlled release of atomic energy." In the Author's Own Words: "There are two possible outcomes: If the result confirms the hypothesis, then you've made a measurement. If the result is contrary to the hypothesis, then you've made a discovery." — Enrico Fermi

Critical Acclaim for Enrico Fermi: "He was simply unable to let things be foggy. Since they always are, this kept him pretty active." — J. Robert Oppenheimer

I took a thermodynamics course a few years ago and am reading this book now to brush up on the subject. I am currently half way through the book. This text is succinct with few examples which I personally enjoy since I can read the entire book fairly quickly. It is well written and hits all the major concepts. Fermi does a nice job of giving interpretations to formulas where appropriate and provides proofs and derivations. This is exactly what I was looking for. The text is excellent as a brush-up text. However, if you are looking for an introductory text, you would be better off buying a larger text which includes more discussion and provides more examples. Also, this particular book has many minor typos. It is never a problem to catch them almost immediately but it is a bit distracting.

It has been easy to read and follow along the examples. One needs is the common STEM mathematics, classical physics concepts, and curiosity. Very illustrative for an Electrical Engineer, it is simple to relate the common electrical expressions to the short but important connection to electrical phenomenon as described in the book. It is clear and concise for the research oriented that needs either a jump start or a reminder on the topic. The reader would benefit from more definite solved examples through each of the chapters. The concepts are clear and thoroughly explained.

We're dealing here with one of the great physicists of all time, a Nobel Prize winner and one of the chief developers of quantum mechanics. So for Dr. Fermi this subject is a cakewalk, but that also means his explanations are superbly lucid. I have never run across a better short text on this

subject than this one, and I've run across a few. I haven't finished it yet and am looking forward to his discussion of osmosis, a subject even my 300-page thermodynamics college textbook (a classic of its own) avoids.

I am a recently retired electrical engineer. One goal I have had for retirement is to try to become knowledgeable about energy, on account of it being in my view the most crucial technical issue that will determine the well-being or lack thereof of mankind in the coming years. As I have read various articles and books on contemporary energy topics, it dawned on me that I need to get a better grounding in thermodynamics and chemistry. I had one course in thermodynamics in school, but, as an EE, I think I just learned it well enough to pass the tests without understanding it in depth. There is an excellent book on renewable energy called "Fundamentals of Renewable Energy Processes" that covers the gamut of energy alternatives, and is geared toward someone with a science/engineering background, as compared to the many books on the topic of energy that are written at a layman's level. There is some good material in the early chapters of that book on thermodynamics and heat engines. However, I felt like I should get a few additional books on thermodynamics to make sure I have a good grasp of the fundamentals. Fermi's book has proved to be very useful in that regard. I have only gone through the chapters on the 1st & second laws and entropy, which I think may be all I need to know for now. I was concerned that a book by Fermi might be over my head. To my delight, I found that is not the case. For me, the level of difficulty was just right- he does not cut corners, but it is at a level where I think most undergraduate engineering students would be able to grasp it without tremendous agony. But, although it is not overly abstract, Fermi approaches the subject from a physicist's perspective, which is: Whatever concept he is covering, he doesn't pull it out of a hat, he explains where it comes from. I believe everything I ever did in my engineering career that was of substance was in an area where I had a decent grasp of the origins of the formulas and concepts I was working with. Fermi's book is the most valuable tool I have found to get such a grounding in the basic laws of thermodynamics. I have only read through the chapter on entropy- I'm not sure whether I will need the rest of the material, but I will probably discover before too long that the answer is yes. I now feel better prepared to read up on practical heat engines. I believe it will be easier to learn such material and I will understand it better on account of having gotten the fundamentals from Fermi's book.

I bought this book about two years ago and read through the first two chapters and completed the practice problems. Since then I have gone back to school for a Masters in Mechanical Engineering

and am taking an Advanced Thermodynamics course. I pretty-much don't need anything else but this 150 pg. book. It is very clear, to the point, great derivations, and is making my life extremely easy. Get this, it costs only \$10 and worth much more.

First published in 1937, this book is a masterful treatment by a master physicist. Weighing in at just over 150 pages, it manages to cover all the really essential topics in this subject. Furthermore there are a few excellent examples that nicely illustrate the power of thermodynamic methods. The treatment and use of free energy are notable high points in this work. Sadly, this book is probably still not appropriate for readers who have no knowledge of thermodynamics or the physics of heat more generally, but it would make an ideal second book on the subject. However, The Feynman Lectures are enough to make this book accessible. The chapter titles give a good idea of the contents:

- 1) Thermodynamic Systems
- 2) The First Law of Thermodynamics
- 3) The Second Law of Thermodynamics
- 4) The Entropy
- 5) Thermodynamic Potentials
- 6) Gaseous Reactions
- 7) Thermodynamics of Dilute Solutions
- 8) The Entropy Constant

I believe that Fermi's Thermodynamics, Hawking's The Grand Design and Joos's Theoretical Physics are by far the best of their kind. I used Fermi's and Joos's books many years ago as a student at the Israel Institute of Technology in Haifa. Years later I gave them to one of my students and bought them recently, mostly for sentimental reasons but also to refresh my memory on certain points of interest. Its nice to have them back on my bookshelf. Ephraim Ravid

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