

Thermodynamics and Kinetics in Materials Science: A Short Course Includes CD-ROM

By Boris S. Bokstein, Mikhail I. Mendelev, David J. Srolovitz

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This text presents a concise and thorough introduction to the main concepts and practical applications of thermodynamics and kinetics in materials science. It is designed with two types of uses in mind: firstly for one or two semester university course for mid- to - upper level undergraduate or first year graduate students in a materials-science-oriented discipline and secondly for individuals who want to study the materials on their own. The following major topics are discussed: basic laws of classical and irreversible thermodynamics, phase equilibria, theory of solutions, chemical reaction thermodynamics and kinetics, surface phenomena, stressed systems, diffusion and statistical thermodynamics. A large number of example problems with detailed solutions are included as well as accompanying computer-based self-tests, consisting of over 400 questions and 2000 answers with hints for students. Computer-based laboratories are provided, in which a laboratory problem is posed and the experiment described. The student can "perform" the experiments and change the laboratory conditions to obtain the data required for meeting the laboratory objective. Each "laboratory" is augmented with background material to aid analysis of the experimental results.

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- Sales Rank: #2809983 in Books
- Published on: 2005-09-01
- Original language: English
- Number of items: 1
- Dimensions: 7.40" h x .60" w x 9.60" l, 1.70 pounds
- Binding: Paperback
- 344 pages

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Editorial Review

Review

"This text introduces the main concepts and practical applications of thermodynamics and kinetics within the discipline of materials science. The authors assume readers are familiar with the concepts taught in introductory university courses in physics and chemistry, and cover basic laws of classical and irreversible thermodynamics, phase equilibria, the thermodynamic theory of solutions, chemical reaction thermodynamics and kinetics, surface and interfacial phenomena, stressed systems, diffusion and statistical thermodynamics of gases and condensed matter. Users also have about 400 exercise questions and example problem solutions. Although designed for use in a two-semester university course for upper-level undergraduates or first year graduate students, the authors also intended readers to use this as a self-study guide."--*SciTech Book News*

About the Author

Boris S. Bokstein is a professor in the Department of Physical Chemistry, Moscow State Institute of Steel and Alloys, Russia. **Mikhail I. Mendelev** is an associate scientist at Ames Laboratory, Iowa. **David J. Srolovitz** is a professor in the Department of Mechanical and Aerospace Engineering, Princeton Institute for the Science and Technology of Materials.

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