This textbook provides a basic understanding of the formative processes of igneous and metamorphic rocks through quantitative applications of simple physical and chemical principles. The book encourages a deeper comprehension of the subject by explaining the petrologic principles rather than simply presenting the student with petrologic facts and terminology. Assuming knowledge of only introductory college-level courses in physics, chemistry, and calculus, it lucidly outlines mathematical derivations fully and at an elementary level, and is ideal for intermediate and advanced courses in igneous and metamorphic petrology.

The end-of-chapter quantitative problem sets facilitate student learning by working through simple applications. They also introduce widely used thermodynamic software programs for calculating igneous and metamorphic phase equilibria, and image analysis software. With over 500 illustrations, this revised edition contains valuable new material on the structure of the Earth's mantle and core, the properties and behavior of magmas, recent results from satellite imaging, and more.

- Promotes a conceptual approach to petrology by focusing on principles rather than facts and memorization
- Builds an in-depth understanding of petrologic principles through a quantitative approach that is supported by instructive end-of-chapter problem sets
- Amply illustrated with over 350 figures, where all phase diagrams are accompanied by photomicrographs, thereby linking descriptive aspects of petrology with the fundamental principles governing the origin of rocks
- Supports student learning by beginning with simple principles of physics and chemistry
- Explains the use of popular thermodynamic software programs for calculating igneous and metamorphic phase equilibria and image analysis software

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"It emphasizes principles rather than facts. The end-of-chapter problems for students are excellent."
Tim Lutz, University of Pennsylvania, USA

"I am very pleased to see the quality of this text. It will definitely be the best undergraduate petrology text when it appears on the shelf. You have a winner."
C. Page Chamberlain, Dartmouth College, USA

"The presentation is clear and concise, the illustrations extremely useful ... Of great utility are the problems at the end of each chapter ... This is a fantastic book."
Steven R. Bohlen, President of Joint Oceanographic Institutions, USA

Designed by Phil Treble.

Cover illustration: photomicrographs of thin sections of related igneous and metamorphic rocks: (above) basalt showing an ophitic intergrowth of gray plagioclase in highly birefringent olivine and pyroxene under crossed-polarized light; (below) basalt's high-pressure, low-temperature metamorphic equivalent blueschist, consisting of blue glaucophane and clear garnet (lower right) and epidote (upper right and left) under plane-polarized light.

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