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Sommario/riassunto	This open access textbook fills a gap, in that it introduces readers to the theory and applications of the Phase-Field technique. Phase Field, over the years, has emerged as a standard tool for materials research, just as the Finite-Element technique has in structure mechanics. Whereas the few existing textbooks on this topic are intended for advanced readers, this one is made accessible to the widest possible audience, through an engaging, lecture format. The content grows out of a course the authors teach for graduate students at Ruhr-University Bochum. Even readers who may, at first, have no clue at all what a “Phase Field” is and for what it is used, are invited on a journey from general physics of thermodynamics and wave mechanics, through applications in all fields of materials science, up to the central questions of physical being. On this journey all the necessary techniques are detailed, mostly formulated in a mathematical language easily understood by engineers and natural scientists.