



Introduction to Materials Science and Engineering: A Guided Inquiry

By Elliot P. Douglas

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For students taking the Materials Science course in the Mechanical & Aerospace Engineering department. This book is also suitable for professionals seeking a guided inquiry approach to materials science.

This unique book is designed to serve as an active learning tool that uses carefully selected information and *guided inquiry* questions. *Guided inquiry* helps readers reach true understanding of concepts as they develop greater ownership over the material presented. First, background information or data is presented. Then, concept invention questions lead the students to construct their own understanding of the fundamental concepts represented. Finally, application questions provide the reader with practice in solving problems using the concepts that they have derived from their own valid conclusions.

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Editorial Review

Review

"The development of a framework of Guided Inquiry activities specific to introducing Materials Science and Engineering is clearly the defining, outstanding feature of this book. This text will greatly ease the burden on MSE instructors who seek to incorporate Guided Inquiry into their teaching approach."

– Jerry Floro, University of Virginia

"The best feature of this book is the manner by which the students are able to build their knowledge. It allows us teachers to become the Cognitive Coaches, where we are charged now with motivating and guiding students through their cognitive game of life or in this instance their 'game of material science.'"

– Cindy Waters, North Carolina A&T University

"This is pedagogy of the future....Great job, Dr. Douglas! This is good stuff."

– Patrick Ferro, Gonzaga University

"I would describe this book as a means to begin engaging students in constructing their own knowledge which will improve their understanding and their interest in Materials Science. I think that it is more satisfying to teach with this approach and offers frequent opportunities to interact with the students. This helps to better understand what the students are thinking and how best to use resources to promote their learning."

– Steve Krause, Arizona State University

"The book's greatest strength is that it not only provides a different approach from the traditional materials science book, but actually does so by supporting a teaching strategy known to produce better outcomes to the lecture method supported by traditional textbooks."

– Trevor Harding, California Polytechnic State University

"The move to providing a project oriented guided learning book for an introductory materials engineering course is challenging. The author has done a good job of balancing the broad materials classes and needs of the course with the open ended aspect of the guided learning format. The balance between explanations and inquiry is well done."

– David Bahr, Purdue University

"The inquisitive questions the author uses to direct the readers to probe themselves are fun, help understand the basis of materials structures and properties and lead to a fundamental understanding of materials science."

– Richard Hennig, Cornell University

From the Back Cover

From the author, Elliot P. Douglas:

This book is based on the concept of guided inquiry. Guided inquiry is an approach to learning based on research on how people think and learn... This approach has been used successfully in a wide variety of classrooms, from large introductory classes of 300 students to smaller classes of 20. There are many variations of this approach and each instructor must decide what works best for their classroom. Ultimately,

however, the focus should be on enabling students to actively engage in the content, work through the concepts, and ultimately discover those concepts for themselves.

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