



Abstract Algebra: Structures and Applications

By Stephen Lovett

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Abstract Algebra: Structures and Applications By Stephen Lovett

A Discovery-Based Approach to Learning about Algebraic Structures

Abstract Algebra: Structures and Applications helps students understand the abstraction of modern algebra. It emphasizes the more general concept of an algebraic structure while simultaneously covering applications. The text can be used in a variety of courses, from a one-semester introductory course to a full two-semester sequence.

The book presents the core topics of structures in a consistent order:

- Definition of structure
- Motivation
- Examples
- General properties
- Important objects
- Description
- Subobjects
- Morphisms
- Subclasses
- Quotient objects
- Action structures
- Applications

The text uses the general concept of an algebraic structure as a unifying principle and introduces other algebraic structures besides the three standard ones (groups, rings, and fields). Examples, exercises, investigative projects, and entire sections illustrate how abstract algebra is applied to areas of science and other branches of mathematics.

"Lovett (Wheaton College) takes readers through the variegated landscape of

algebra, from elementary modular arithmetic through groups, semigroups, and monoids, past rings and fields and group actions, beyond modules and algebras, to Galois theory, multivariable polynomial rings, and Gröbner bases."

Choice Reviewed: Recommended

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Editorial Review

Review

"... lucid, detailed, and versatile main text comes with a wealth of illustrating examples and very instructive exercises in each single section of the book, and each chapter ends with a section containing project ideas (and hints) to challenge the student to write her or his own investigative or expository papers on related topics. ... an excellent introduction to the principles of abstract algebra for upper undergraduate and graduate students, and a valuable source for instructors likewise. No doubt, this text is a highly welcome addition to the already existing plethora of primers on abstract algebra in the mathematical literature."

?*Zentralblatt MATH* 1323

"This is a text for a serious upper-level undergraduate course in abstract algebra. It adopts a 'groups first' approach to the subject, and, although it starts from scratch, winds up covering more than enough material to fill out two semesters. The topic coverage is very extensive for an undergraduate text ... The author does an excellent job of balancing theory with applications. ... The inclusion of all the topics described above and the large number of exercises, examples and projects make for an undeniably interesting text ... a well-written book with interesting features ... "

?*MAA Reviews*, November 2015

About the Author

Stephen Lovett is an associate professor of mathematics at Wheaton College. He is a member of the Mathematical Association of America, American Mathematical Society, and Association of Christians in the Mathematical Sciences. He earned a PhD from Northeastern University. His research interests include commutative algebra, algebraic geometry, differential geometry, cryptography, and discrete dynamical systems.

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