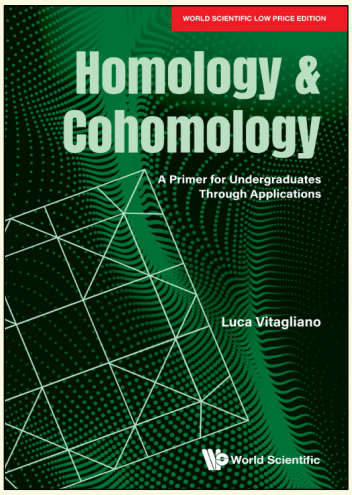
Homology & Cohomology

A Primer for Undergraduates Through Applications



By **Luca Vitagliano**
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ABOUT THE BOOK

The book introduces (co)homology theory and some of its applications in Algebra and Geometry. It is intended for undergraduate Mathematics students, as well as graduate and postgraduate students in other fields, particularly Theoretical Physics, who require a highly compact overview of this vast theory. The book also explores how (co)homology theory naturally arises in seemingly unrelated areas of Mathematics.

The theory is presented from scratch, requiring no prerequisites other than basic linear algebra, point-set topology, and calculus. The presentation is simple, concise, yet rigorous, making it accessible to undergraduate Mathematics and likely Physics students from the third year onward. The book emphasizes the theory's numerous applications across Algebra and Geometry, rather than focusing solely on the theoretical aspects. The pedagogical approach of this book, complemented by examples and exercises, sets it apart from standard textbooks in Homological Algebra and Algebraic Topology. The end-of-chapter problems offer insight into more advanced material and serve as a tool for testing comprehension of the theory.

After having gone through these lecture notes, the reader will be ready to tackle more specialized and advanced subjects such as Homological Algebra, Homotopy Theory, and Algebraic Topology.

READERSHIP

Undergraduate students in Mathematics and Physics, as well as graduate and postgraduate students in other fields, particularly Theoretical Physics.

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Contd.

- Categories and Functors
- Applications in Algebra
- Singular Homology
- de Rham Cohomology

ABOUT THE AUTHOR

Luca Vitagliano is a Full Professor of Geometry at the University of Salerno, Italy, where he regularly teaches Geometry courses to bachelor's, master's, and PhD students. His main research interests lie in Differential Geometry, with a slight emphasis on those aspects that are inspired by Mathematical Physics. He is the (co)author of around 40 scientific papers published in distinguished international mathematical journals in the field and has been invited to present his results to several international conferences. In 2024, he published a textbook for undergraduates *A Primer on Smooth Manifolds* with WSPC.

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