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## KEITH DALE

### Algebraic Topology

MIT Press

"Topology can present significant challenges for undergraduate students of mathematics and the sciences. 'Understanding topology' aims to change that. The perfect introductory topology textbook, 'Understanding topology' requires only a knowledge of calculus and a general familiarity with set theory and logic. Equally approachable and rigorous, the book's clear organization, worked examples, and concise writing style support a thorough understanding of basic topological principles. Professor Shaun V. Ault's unique emphasis on fascinating applications, from chemical dynamics to determining the shape of the universe, will engage students in a way traditional topology textbooks do not"--Back cover.

*Topology* American Mathematical Soc.

This textbook provides a succinct introduction to algebraic topology. It follows a modern categorical approach from the beginning and gives ample motivation throughout so that students will find this an ideal first encounter to the field. Topics are

treated in a self-contained manner, making this a convenient resource for instructors searching for a comprehensive overview of the area. It begins with an outline of category theory, establishing the concepts of functors, natural transformations, adjunction, limits, and colimits. As a first application, van Kampen's theorem is proven in the groupoid version. Following this, an excursion to cofibrations and homotopy pushouts yields an alternative formulation of the theorem that puts the computation of fundamental groups of attaching spaces on firm ground. Simplicial homology is then defined, motivating the Eilenberg-Steenrod axioms, and the simplicial approximation theorem is proven. After verifying the axioms for singular homology, various versions of the Mayer-Vietoris sequence are derived and it is shown that homotopy classes of self-maps of spheres are classified by degree.The final chapter discusses cellular homology of CW complexes, culminating in the uniqueness theorem for ordinary homology. Introduction to Algebraic Topology is suitable for a single-semester graduate course on algebraic topology. It can also be used for self-study, with numerous examples, exercises, and motivating remarks included.

**Introduction to Topology and Geometry** Springer Science & Business Media
Concise undergraduate introduction to fundamentals of topology — clearly and engagingly written, and filled with stimulating, imaginative exercises. Topics include set theory, metric and topological spaces, connectedness, and compactness. 1975 edition.

**General Topology** CRC Press
This text explains nontrivial applications of metric space topology to analysis. Covers metric space, point-set topology, and algebraic topology. Includes exercises, selected answers, and 51 illustrations. 1983 edition.

**Topology** Springer Science & Business Media
This material is intended to contribute to a wider appreciation of the mathematical words "continuity and linearity". The book's purpose is to illuminate the meanings of these words and their relation to each other -- Product Description.

Lecture Notes in Algebraic Topology Alpha Science Int'l Ltd.
This introduction to some basic ideas in algebraic topology is devoted to the foundations and applications of homology theory. After the essentials of singular homology and some important applications are given, successive topics covered include attaching spaces, finite CW complexes,

cohomology products, manifolds, Poincare duality, and fixed point theory. This second edition includes a chapter on covering spaces and many new exercises.

*Understanding Topology* Springer

Manifolds play an important role in topology, geometry, complex analysis, algebra, and classical mechanics. Learning manifolds differs from most other introductory mathematics in that the subject matter is often completely unfamiliar. This introduction guides readers by explaining the roles manifolds play in diverse branches of mathematics and physics. The book begins with the basics of general topology and gently moves to manifolds, the fundamental group, and covering spaces.

**Topology I** Springer Nature

A graduate-level textbook that presents basic topology from the perspective of category theory. This graduate-level textbook on topology takes a unique approach: it reintroduces basic, point-set topology from a more modern, categorical perspective. Many graduate students are familiar with the ideas of point-set topology and they are ready to learn something new about them. Teaching the subject using category theory--a contemporary branch of mathematics that provides a way to represent abstract

concepts--both deepens students' understanding of elementary topology and lays a solid foundation for future work in advanced topics.

**Elements of Topology** University of Chicago Press

This text on contact topology is a comprehensive introduction to the subject, including recent striking applications in geometric and differential topology: Eliashberg's proof of Cerf's theorem via the classification of tight contact structures on the 3-sphere, and the Kronheimer-Mrowka proof of property P for knots via symplectic fillings of contact 3-manifolds. Starting with the basic differential topology of contact manifolds, all aspects of 3-dimensional contact manifolds are treated in this book. One notable feature is a detailed exposition of Eliashberg's classification of overtwisted contact structures. Later chapters also deal with higher-dimensional contact topology. Here the focus is on contact surgery, but other constructions of contact manifolds are described, such as open books or fibre connected sums. This book serves both as a self-contained introduction to the subject for advanced graduate students and as a reference for researchers.

Basic Concepts of Algebraic Topology Springer Science & Business Media

This text contains a detailed introduction to general topology and an introduction to algebraic topology via its most classical and elementary segment. Proofs of theorems are separated from their formulations and are gathered at the end of each chapter, making this book appear like a problem book and also giving it appeal to the expert as a handbook. The book includes about 1,000 exercises.

*The Knot Book* John Wiley & Sons

"Topology of Metric Spaces gives a very streamlined development of a course in metric space topology emphasizing only the most useful concepts, concrete spaces and geometric ideas to encourage geometric thinking, to treat this as a preparatory ground for a general topology course, to use this course as a surrogate for real analysis and to help the students gain some perspective of modern analysis." "Eminently suitable for self-study, this book may also be used as a supplementary text for courses in general (or point-set) topology so that students will acquire a lot of concrete examples of spaces and maps."--BOOK JACKET.

Introduction to Topology American Mathematical Soc.

This book provides a concise introduction to topology and is necessary for courses in differential geometry, functional analysis, algebraic topology, etc. Topology is a fundamental tool in most branches of pure

mathematics and is also omnipresent in more applied parts of mathematics. Therefore students will need fundamental topological notions already at an early stage in their bachelor programs. While there are already many excellent monographs on general topology, most of them are too large for a first bachelor course. Topology fills this gap and can be either used for self-study or as the basis of a topology course.

*Introduction to General Topology* Springer

An introductory textbook suitable for use in a course or for self-study, featuring broad coverage of the subject and a readable exposition, with many examples and exercises.

*Introduction to Topology* Jones & Bartlett Learning

The amount of algebraic topology a graduate student specializing in topology must learn can be intimidating. Moreover, by their second year of graduate studies, students must make the transition from understanding simple proofs line-by-line to understanding the overall structure of proofs of difficult theorems. To help students make this transition, the material in this book is presented in an increasingly sophisticated manner. It is intended to bridge the gap between algebraic and geometric topology, both by providing the algebraic tools that a geometric topologist

needs and by concentrating on those areas of algebraic topology that are geometrically motivated. Prerequisites for using this book include basic set-theoretic topology, the definition of CW-complexes, some knowledge of the fundamental group/covering space theory, and the construction of singular homology. Most of this material is briefly reviewed at the beginning of the book. The topics discussed by the authors include typical material for first- and second-year graduate courses. The core of the exposition consists of chapters on homotopy groups and on spectral sequences. There is also material that would interest students of geometric topology (homology with local coefficients and obstruction theory) and algebraic topology (spectra and generalized homology), as well as preparation for more advanced topics such as algebraic $K$-theory and the s-cobordism theorem. A unique feature of the book is the inclusion, at the end of each chapter, of several projects that require students to present proofs of substantial theorems and to write notes accompanying their explanations. Working on these projects allows students to grapple with the “big picture”, teaches them how to give mathematical lectures, and prepares them for participating in research seminars. The book is designed as a

textbook for graduate students studying algebraic and geometric topology and homotopy theory. It will also be useful for students from other fields such as differential geometry, algebraic geometry, and homological algebra. The exposition in the text is clear; special cases are presented over complex general statements.

**Topological Groups and Related Structures, An Introduction to Topological Algebra.** Springer Science & Business Media

This is an introductory textbook on general and algebraic topology, aimed at anyone with a basic knowledge of calculus and linear algebra. It provides full proofs and includes many examples and exercises. The covered topics include: set theory and cardinal arithmetic; axiom of choice and Zorn's lemma; topological spaces and continuous functions; connectedness and compactness; Alexandrov compactification; quotient topologies; countability and separation axioms; prebasis and Alexander's theorem; the Tychonoff theorem and paracompactness; complete metric spaces and function spaces; Baire spaces; homotopy of maps; the fundamental group; the van Kampen theorem; covering spaces; Brouwer and Borsuk's theorems; free groups and free product of groups; and basic category theory.

While it is very concrete at the beginning, abstract concepts are gradually introduced. It is suitable for anyone needing a basic, comprehensive introduction to general and algebraic topology and its applications.

**Introduction to Piecewise-Linear Topology** Springer Science & Business Media

Knots are familiar objects. Yet the mathematical theory of knots quickly leads to deep results in topology and geometry. This work offers an introduction to this theory, starting with our understanding of knots. It presents the applications of knot theory to modern chemistry, biology and physics.

*Algebraic Topology: An Intuitive Approach* JHU Press

This should be a revelation for mathematics undergraduates. Having evolved from Runde's notes for an introductory topology course at the University of Alberta, this essential text provides a concise introduction to set-theoretic topology, as well as some algebraic topology. It is accessible to undergraduates from the second year on, and even beginning graduate students can benefit from some sections. The well-chosen selection of examples is accessible to students who have a background in calculus and elementary algebra, but not necessarily in real or complex analysis. In

places, Runde's text treats its material differently to other books on the subject, providing a fresh perspective.
*A Concise Course in Algebraic Topology* American Mathematical Society In this book, which may be used as a self-contained text for a beginning course, Professor Lefschetz aims to give the reader a concrete working knowledge of the central concepts of modern combinatorial topology: complexes, homology groups, mappings in spheres, homotopy, transformations and their fixed points, manifolds and duality theorems. Each chapter ends with a group of problems. Originally published in 1949. The Princeton Legacy Library uses the latest print-on-demand technology to again make available previously out-of-print books from the distinguished backlist of Princeton University Press. These editions preserve the original texts of these important books while presenting them in durable paperback and hardcover editions. The goal of the Princeton Legacy Library is to vastly increase access to the rich scholarly heritage found in the thousands of books published by Princeton University Press since its founding in 1905.
*Introduction to Topology* Princeton University Press Combining concepts from topology and algorithms, this book delivers what its title promises: an

introduction to the field of computational topology. Starting with motivating problems in both mathematics and computer science and building up from classic topics in geometric and algebraic topology, the third part of the text advances to persistent homology. This point of view is critically important in turning a mostly theoretical field of mathematics into one that is relevant to a multitude of disciplines in the sciences and engineering. The main approach is the discovery of topology through algorithms. The book is ideal for teaching a graduate or advanced undergraduate course in computational topology, as it develops all the background of both the mathematical and algorithmic aspects of the subject from first principles. Thus the text could serve equally well in a course taught in a mathematics department or computer science department.

Topology Birkhäuser

Topology is a large subject with several branches, broadly categorized as algebraic topology, point-set topology, and geometric topology. Point-set topology is the main language for a broad range of mathematical disciplines, while algebraic topology offers as a powerful tool for studying problems in geometry and numerous other areas of mathematics. This book presents the basic concepts of

topology, including virtually all of the traditional topics in point-set topology, as well as elementary topics in algebraic topology such as fundamental groups and covering spaces. It also discusses topological groups and transformation groups. When combined with a working knowledge of analysis and algebra, this book offers a valuable resource for advanced undergraduate and beginning graduate students of mathematics specializing in algebraic topology and harmonic analysis.