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**A First Course in Topology** Springer Science & Business Media

An introductory textbook on cohomology and curvature with emphasis on applications.

**Iterative Methods in Combinatorial Optimization** Courier Corporation

Model categories are used as a tool for inverting certain maps in a category in a controllable manner. They are useful in diverse areas of mathematics. This book offers a comprehensive study of the relationship between a model category and its homotopy

category. It develops the theory of model categories, giving a development of the main examples.

**Topology from the Differentiable Viewpoint** American Mathematical Soc.

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.

**Real Mathematical Analysis** John Wiley & Sons

With the advent of approximation algorithms for NP-hard combinatorial optimization problems, several techniques from exact optimization such as the primal-dual method have proven their staying power and versatility. This book describes a simple and powerful method that is iterative in essence and similarly useful in a variety of settings for exact and approximate optimization. The authors highlight the commonality and uses of this method to prove a variety of classical polyhedral results on matchings, trees, matroids and flows. The presentation style is elementary enough to be accessible to anyone with exposure to basic linear algebra and graph theory, making the book suitable for introductory courses in combinatorial optimization at the upper undergraduate and beginning graduate levels. Discussions of advanced

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applications illustrate their potential for future application in research in approximation algorithms.

**On Thom Spectra, Orientability, and Cobordism**

American Mathematical Soc.

Differential Topology provides an elementary and intuitive introduction to the study of smooth manifolds. In the years since its first publication, Guillemin and Pollack's book has become a standard text on the subject. It is a jewel of mathematical exposition, judiciously picking exactly the right mixture of detail and generality to display the richness within. The text is mostly self-contained, requiring only undergraduate analysis and linear algebra. By relying on a unifying idea--transversality--the authors are able to avoid the use of big machinery or ad hoc techniques to establish the main results. In this way, they present intelligent treatments of important theorems, such as the Lefschetz fixed-point theorem, the Poincaré-Hopf index theorem, and Stokes theorem. The book has a wealth of exercises of various types. Some are routine explorations of the main material. In others, the students are guided step-by-step through proofs of fundamental results, such as the Jordan-Brouwer separation theorem. An exercise section in Chapter 4 leads the student through a construction of de Rham cohomology and a proof of its homotopy invariance. The book is

suitable for either an introductory graduate course or an advanced undergraduate course.

**Topology** American Mathematical Soc.

For a senior undergraduate or first year graduate-level course in Introduction to Topology.

Appropriate for a one-semester course on both general and algebraic topology or separate courses treating each topic separately. This title is part of the Pearson Modern Classics series. Pearson Modern Classics are acclaimed titles at a value price. Please visit [www.pearsonhighered.com/math-classics-series](http://www.pearsonhighered.com/math-classics-series) for a complete list of titles. This text is designed to provide instructors with a convenient single text resource for bridging between general and algebraic topology courses. Two separate, distinct sections (one on general, point set topology, the other on algebraic topology) are each suitable for a one-semester course and are based around the same set of basic, core topics. Optional, independent topics and applications can be studied and developed in depth depending on course needs and preferences.

A Primer on Mapping Class Groups Springer Science & Business Media

This textbook on algebraic topology updates a popular textbook from the golden era of the Moscow school of I. M. Gelfand. The first English translation, done many decades ago, remains very much in demand, although it has been long out-of-print and is difficult to obtain. Therefore, this updated

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English edition will be much welcomed by the mathematical community. Distinctive features of this book include: a concise but fully rigorous presentation, supplemented by a plethora of illustrations of a high technical and artistic caliber; a huge number of nontrivial examples and computations done in detail; a deeper and broader treatment of topics in comparison to most beginning books on algebraic topology; an extensive, and very concrete, treatment of the machinery of spectral sequences. The second edition contains an entirely new chapter on K-theory and the Riemann-Roch theorem (after Hirzebruch and Grothendieck).

*Geometric and Topological Inference* CRC 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.

**From Calculus to Cohomology** Cambridge University Press

This textbook is a completely revised, updated, and expanded English edition of the important *Analyse fonctionnelle* (1983). In addition, it contains a wealth of problems and exercises (with solutions) to guide the reader. Uniquely, this book presents in a coherent, concise and unified way the main results from functional analysis together with the main results from the theory of partial differential equations (PDEs). Although there are many books on functional analysis and many on PDEs, this is the first to cover both of these closely connected topics. Since the French book was first published, it has been translated into Spanish, Italian, Japanese, Korean, Romanian, Greek and Chinese. The English edition makes a welcome addition to this list.

**Model Categories** Univalent Foundations

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

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giving it appeal to the expert as a handbook. The book includes about 1,000 exercises. Shock Formation in Small-Data Solutions to 3D Quasilinear Wave Equations American Mathematical Society

Topological data analysis (TDA) has emerged recently as a viable tool for analyzing complex data, and the area has grown substantially both in its methodologies and applicability. Providing a computational and algorithmic foundation for techniques in TDA, this comprehensive, self-contained text introduces students and researchers in mathematics and computer science to the current state of the field. The book features a description of mathematical objects and constructs behind recent advances, the algorithms involved, computational considerations, as well as examples of topological structures or ideas that can be used in applications. It provides a thorough treatment of persistent homology together with various extensions - like zigzag persistence and multiparameter persistence - and their applications to different types of data, like point clouds, triangulations, or graph data. Other important topics covered include discrete

Morse theory, the Mapper structure, optimal generating cycles, as well as recent advances in embedding TDA within machine learning frameworks.

### **A Concise Course in Algebraic Topology**

American Mathematical Soc.

Persistence theory emerged in the early 2000s as a new theory in the area of applied and computational topology. This book provides a broad and modern view of the subject, including its algebraic, topological, and algorithmic aspects. It also elaborates on applications in data analysis. The level of detail of the exposition has been set so as to keep a survey style, while providing sufficient insights into the proofs so the reader can understand the mechanisms at work. The book is organized into three parts. The first part is dedicated to the foundations of persistence and emphasizes its connection to quiver representation theory. The second part focuses on its connection to applications through a few selected topics. The third part provides perspectives for both the theory and its applications. The book can be used as a text for a course on applied topology or data analysis.

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All the Mathematics You Missed American  
Mathematical Soc.

The theory of characteristic classes provides a meeting ground for the various disciplines of differential topology, differential and algebraic geometry, cohomology, and fiber bundle theory. As such, it is a fundamental and an essential tool in the study of differentiable manifolds. In this volume, the authors provide a thorough introduction to characteristic classes, with detailed studies of Stiefel-Whitney classes, Chern classes, Pontrjagin classes, and the Euler class. Three appendices cover the basics of cohomology theory and the differential forms approach to characteristic classes, and provide an account of Bernoulli numbers. Based on lecture notes of John Milnor, which first appeared at Princeton University in 1957 and have been widely studied by graduate students of topology ever since, this published version has been completely revised and corrected.

**Exotic Smoothness and Physics** University of  
Chicago Press

Multivariable Mathematics combines linear algebra and multivariable mathematics in a rigorous approach. The material is integrated to emphasize the recurring theme of implicit versus explicit that persists in

linear algebra and analysis. In the text, the author includes all of the standard computational material found in the usual linear algebra and multivariable calculus courses, and more, interweaving the material as effectively as possible, and also includes complete proofs. \* Contains plenty of examples, clear proofs, and significant motivation for the crucial concepts. \* Numerous exercises of varying levels of difficulty, both computational and more proof-oriented. \* Exercises are arranged in order of increasing difficulty.

Functional Analysis, Sobolev Spaces and Partial  
Differential Equations ???????????

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** Springer Science & Business Media  
Elements of Algebraic Topology provides the most concrete approach to the subject. With coverage of homology and cohomology theory, universal coefficient theorems, Kunneth theorem, duality in

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manifolds, and applications to classical theorems of point-set topology, this book is perfect for communicating complex topics and the fun nature of algebraic topology for beginners.

Computational Topology for Data Analysis

Princeton University Press

A readable introduction to the subject of calculus on arbitrary surfaces or manifolds. Accessible to readers with knowledge of basic calculus and linear algebra. Sections include series of problems to reinforce concepts.

*VLSI Design Methodologies for Digital Signal Processing Architectures* Cambridge University Press

Designing VLSI systems represents a challenging task. It is a transformation among different specifications corresponding to different levels of design: abstraction, behavioral, structural and physical. The behavioral level describes the functionality of the design. It consists of two components; static and dynamic. The static component describes operations, whereas the dynamic component describes sequencing and timing. The structural level contains information about components, control and connectivity. The physical level describes the constraints that should be imposed on the floor plan, the placement of components, and the geometry of the design. Constraints of

area, speed and power are also applied at this level. To implement such multilevel transformation, a design methodology should be devised, taking into consideration the constraints, limitations and properties of each level. The mapping process between any of these domains is non-isomorphic. A single behavioral component may be transformed into more than one structural component. Design methodologies are the most recent evolution in the design automation era, which started off with the introduction and subsequent usage of module generation especially for regular structures such as PLA's and memories. A design methodology should offer an integrated design system rather than a set of separate unrelated routines and tools. A general outline of a desired integrated design system is as follows:

- \* Decide on a certain unified framework for all design levels.
- \* Derive a design method based on this framework.
- \* Create a design environment to implement this design method.

Differential Topology Cambridge University Press

Topology Through Inquiry is a comprehensive introduction to point-set, algebraic, and geometric topology, designed to support inquiry-based learning (IBL) courses for upper-division undergraduate or beginning

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graduate students. The book presents an enormous amount of topology, allowing an instructor to choose which topics to treat. The point-set material contains many interesting topics well beyond the basic core, including continua and metrizability. Geometric and algebraic topology topics include the classification of 2-manifolds, the fundamental group, covering spaces, and homology (simplicial and singular). A unique feature of the introduction to homology is to convey a clear geometric motivation by starting with mod 2 coefficients. The authors are acknowledged masters of IBL-style teaching. This book gives students joy-filled, manageable challenges that incrementally develop their knowledge and skills. The exposition includes insightful framing of fruitful points of view as well as advice on effective thinking and learning. The text presumes only a modest level of mathematical maturity to begin, but students who work their way through this text will grow from mathematics students into mathematicians. Michael Starbird is a University of Texas Distinguished Teaching Professor of Mathematics. Among his works are two other co-authored books in the

Mathematical Association of America's (MAA) Textbook series. Francis Su is the Benediktsson-Karwa Professor of Mathematics at Harvey Mudd College and a past president of the MAA. Both authors are award-winning teachers, including each having received the MAA's Haimo Award for distinguished teaching. Starbird and Su are, jointly and individually, on lifelong missions to make learning-of mathematics and beyond-joyful, effective, and available to everyone. This book invites topology students and teachers to join in the adventure.

*Characteristic Classes* Princeton University Press  
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