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BRENDAN AGUILAR

A Short Course on Topological Insulators Springer Science & Business Media
"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.
An Introduction to Geometric Topology Elsevier
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 Topological Manifolds Springer Nature
The first five chapters of this book form an introductory course in piece wise-linear topology in which no assumptions are made other than basic topological notions. This course would be suitable as a second course in topology with a geometric flavour, to follow a first course in point-set topology, andi)erhaps to be given as a final year undergraduate course. The whole book gives an account of handle theory in a piecewise linear setting and could be the basis of a first year postgraduate lecture or reading course. Some results from algebraic topology are needed for handle theory and these are collected in an appendix. In a second appen dix are listed the properties of Whitehead torsion which are used in the s-cobordism theorem. These appendices should enable a reader with only basic knowledge to complete the book. The book is also intended to form an introduction to modern geo metric topology as a research subject, a bibliography of research papers being included. We have omitted acknowledgements and references from the main text and have collected these in a set of "historical notes" to be found after the appendices.
General Topology Ingram
"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.
Topological Groups and Related Structures, An Introduction to Topological Algebra. Cambridge University Press
In recent years, many students have been introduced to topology in high school mathematics. Having met the Mobius band, the seven bridges of Konigsberg, Euler's polyhedron formula, and knots, the student is led to expect that these picturesque ideas will come to full flower in university topology courses. What a disappointment "undergraduate topology" proves to be! In most institutions it is either a service course for analysts, on abstract spaces, or else an introduction to homological algebra in which the only geometric activity is the completion of commutative diagrams. Pictures are kept to a minimum, and at the end the student still does nr~ understand the simplest topological facts, such as the rcason why knots exist. In my opinion, a well-balanced introduction to topology should stress its intuitive geometric aspect, while admitting the legitimate interest that analysts and algebraists have in the subject. At any rate, this is the aim of the present book. In support of this view, I have followed the historical development where practicable, since it clearly shows the influence of geometric thought at all stages. This is not to claim that topology received its main impetus from geometric recreations like the seven bridges; rather, it resulted from the l'isualization of problems from other parts of mathematics-complex analysis (Riemann), mechanics (Poincare), and group theory (Dehn). It is these connec tions to other parts of mathematics which make topology an important as well as a beautiful subject.
Homology Theory Springer Science & Business Media
Manifolds, the higher-dimensional analogs of smooth curves and surfaces, are fundamental objects in modern mathematics. Combining aspects of algebra, topology, and analysis, manifolds have also been applied to classical mechanics, general relativity, and quantum field theory. In this streamlined introduction to the subject, the theory of manifolds is presented with the aim of helping the reader achieve a rapid mastery of the essential topics. By the end of the book the reader should be able to compute, at least for simple spaces, one of the most basic topological invariants of a manifold, its de Rham cohomology. Along the way, the reader acquires the knowledge and skills necessary for further study of geometry and topology. The requisite point-set topology is included in an appendix of twenty pages; other appendices review facts from real analysis and linear algebra. Hints and solutions are provided to many of the exercises and problems. This work may be used as the text for a one-semester graduate or advanced undergraduate course, as well as by students engaged in self-study. Requiring only minimal undergraduate prerequisites, 'Introduction to Manifolds' is also an excellent foundation for Springer's GTM 82, 'Differential Forms in Algebraic Topology'.
Topology of Metric Spaces Courier Corporation
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.
Introduction to Topology Springer
This book provides an introduction to topology, differential topology, and differential geometry. It is based on manuscripts refined through use in a variety of lecture courses. The first chapter covers elementary results and concepts from point-set topology. An exception is the Jordan Curve Theorem, which is proved for polygonal paths and is intended to give students a first glimpse into the nature of deeper topological problems. The second chapter of the book introduces manifolds and Lie groups, and examines a wide assortment of examples. Further discussion explores tangent bundles, vector bundles, differentials, vector fields, and Lie brackets of vector fields. This discussion is deepened and expanded in the third chapter, which introduces the de Rham cohomology and the oriented integral and gives proofs of the Brouwer Fixed-Point Theorem, the Jordan-Brouwer Separation Theorem, and Stokes's integral formula. The fourth and final chapter is devoted to the fundamentals of differential geometry and traces the development of ideas from curves to submanifolds of Euclidean spaces. Along the way, the book discusses connections and curvature--the central concepts of differential geometry. The discussion culminates with the Gauß equations and the version of Gauß's theorema egregium for submanifolds of arbitrary dimension and codimension. This book is primarily aimed at advanced undergraduates in mathematics and physics and is intended as the template for a one- or two-semester bachelor's course.
Introduction to Geometry and Topology 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.
Introduction to Piecewise-Linear Topology Createspace Independent Publishing Platform
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.
A Combinatorial Introduction to Topology Springer
Learn the basics of point-set topology with the understanding of its real-world application to a variety of other subjects including science, economics, engineering, and other areas of mathematics. Introduces topology as an important and fascinating mathematics discipline to retain the readers interest in the subject. Is written in an accessible way for readers to understand the usefulness and importance of the application of topology to other fields. Introduces topology concepts combined with their real-world application to subjects such DNA, heart stimulation, population modeling, cosmology, and computer graphics. Covers topics including knot theory, degree theory, dynamical systems and chaos, graph theory, metric spaces, connectedness, and compactness. A useful reference for readers wanting an intuitive introduction to topology.
Introduction to General Topology Springer Science & Business Media
This book provides a self-contained introduction to the topology and geometry of surfaces and three-manifolds. The main goal is to describe Thurston's geometrisation of three-manifolds, proved by Perelman in 2002. The book is divided into three parts: the first is devoted to hyperbolic geometry, the second to surfaces, and the third to three-manifolds. It contains complete proofs of Mostow's rigidity, the thick-thin decomposition, Thurston's classification of the diffeomorphisms of surfaces (via Bonahon's geodesic currents), the prime and JSJ decomposition, the topological and geometric classification of Seifert manifolds, and Thurston's hyperbolic Dehn filling Theorem.
Basic Topology Springer Science & Business Media
A Guide to Topology is an introduction to basic topology for graduate or advanced undergraduate students. It covers point-set topology, Moore-Smith convergence and function spaces. It treats continuity, compactness, the separation axioms, connectedness, completeness, the relative topology, the quotient topology, the product topology, and all the other fundamental ideas of the subject. The book is filled with examples and illustrations. Students studying for exams will find this book to be a concise, focused and informative resource. Professional mathematicians who need a quick review of the subject, or need a place to look up a key fact, will find this book to be a useful resource too.
Introduction to Set Theory and Topology Cambridge University Press
In the last years there have been great advances in the applications of topology and differential geometry to problems in condensed matter physics. Concepts drawn from topology and geometry have become essential to the understanding of several phenomena in the area. Physicists have been creative in producing models for actual physical phenomena which realize mathematically exotic concepts and new phases have been discovered in condensed matter in which topology plays a leading role. An important classification paradigm is the concept of topological order, where the state characterizing a system does not break any symmetry, but it defines a topological phase in the sense that certain fundamental properties change only when the system passes through a quantum phase transition. The main purpose of this book is to provide a brief, self-contained introduction to some mathematical ideas and methods from differential geometry and topology, and to show a few applications in condensed matter. It conveys to physicists the basis for many mathematical concepts, avoiding the detailed formality of most textbooks.
Introduction to Topology American Mathematical Soc.
Combining physics, mathematics and computer science, topological quantum computation is a rapidly expanding research area focused on the exploration of quantum evolutions that are immune to errors. In this book, the author presents a variety of different topics developed together for the first time, forming an excellent introduction to topological quantum computation. The makings of anyonic systems, their properties and their computational power are presented in a pedagogical way. Relevant calculations are fully explained, and numerous worked examples and exercises support and aid understanding. Special emphasis is given to the motivation and physical intuition behind every mathematical concept. Demystifying difficult topics by using accessible language, this book has broad appeal and is ideal for graduate students and researchers from various disciplines

who want to get into this new and exciting research field.
A Brief Introduction to Topology and Differential Geometry in Condensed Matter Physics Springer Science & Business Media
Algebraandtopology,thetwofundamentaldomainsofmathematics,playcomplem- tary roles. Topology studies continuity and convergence and provides a general framework to study the concept of a limit. Much of topology is devoted to handling in?nite sets and in?nity itself; the methods developed are qualitative and, in a certain sense, irrational. - gebra studies all kinds of operations and provides a basis for algorithms and calculations. Very often, the methods here are ?nitistic in nature. Because of this difference in nature, algebra and topology have a strong tendency to develop independently, not in direct contact with each other. However, in applications, in higher level domains of mathematics, such as functional analysis, dynamical systems, representation theory, and others, topology and algebra come in contact most naturally. Many of the most important objects of mathematics represent a blend of algebraic and of topologicalstructures.
Topologicalfunctionspacesandlineartopologicalspacesingeneral, topological groups and topological ?elds, transformation groups, topological lattices are objects of this kind. Very often an algebraic structure and a topology come naturally together; this is the case when they are both determined by the nature of the elements of the set considered (a group of transformations is a typical example). The rules that describe the relationship between a topology and an algebraic operation are almost always transparentandnatural—theoperationhastobecontinuous,jointlyorseparately.
Computational Topology Alpha Science Int'l Ltd.
This book gives a quick introduction to the theory of foliations, Lie groupoids and Lie algebroids. An important feature is the emphasis on the interplay between these concepts: Lie groupoids form an indispensable tool to study the transverse structure of foliations as well as their noncommutative geometry, while the theory of foliations has immediate applications to the Lie theory of groupoids and their infinitesimal algebroids. The book starts with a detailed presentation of the main classical theorems in the theory of foliations then proceeds to Molino's theory, Lie groupoids, constructing the holonomy groupoid of a foliation and finally Lie algebroids. Among other things, the authors discuss to what extent Lie's theory for Lie groups and Lie algebras holds in the more general context of groupoids and algebroids. Based on the authors' extensive teaching experience, this book contains numerous examples and exercises making it ideal for graduate students and their instructors.
Algebraic Topology Cambridge University 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.
A Taste of Topology Springer Science & Business Media
The first half of the book provides an introduction to general topology, with ample space given to exercises and carefully selected applications. The second half of the text includes topics in asymmetric topology, a field motivated by applications in computer science. Recurring themes include the interactions of topology with order theory and mathematics designed to model loss-of-resolution situations.
Introduction to Topology Pearson
Introduction to Set Theory and Topology describes the fundamental concepts of set theory and topology as well as its applicability to analysis, geometry, and other branches of mathematics, including algebra and probability theory. Concepts such as inverse limit, lattice, ideal, filter, commutative diagram, quotient-spaces, completely regular spaces, quasicomponents, and cartesian products of topological spaces are considered. This volume consists of 21 chapters organized into two sections and begins with an introduction to set theory, with emphasis on the propositional calculus and its application to propositions each having one of two logical values, 0 and 1. Operations on sets which are analogous to arithmetic operations are also discussed. The chapters that follow focus on the mapping concept, the power of a set, operations on cardinal numbers, order relations, and well ordering. The section on topology explores metric and topological spaces, continuous mappings, cartesian products, and other spaces such as spaces with a countable base, complete spaces, compact spaces, and connected spaces. The concept of dimension, simplexes and their properties, and cuttings of the plane are also analyzed. This book is intended for students and teachers of mathematics.