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Knot Theory and Its Applications
Basic Category Theory for Computer Scientists
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Category Theory in Context
Principles of Phonetics
Counterexamples in Topology
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Category Theory for Computing Science

Edinburgh University Press

The book covers elementary aspects of category theory and topos theory. It has few mathematical prerequisites, and uses categorical methods throughout rather than beginning with set theoretic foundations. It works with key notions such as cartesian closedness, adjunctions, regular categories, and the internal logic of a topos. Full statements and elementary proofs are given for the central theorems, including the fundamental theorem of toposes, the sheafification theorem, and the construction of Grothendieck toposes over any topos as base. Three chapters discuss applications of toposes in detail, namely to sets, to basic differential geometry, and to recursive analysis. - ;Introduction; PART I:

CATEGORIES: Rudimentary structures in a category; Products, equalizers, and their duals; Groups; Sub-objects, pullbacks, and limits; Relations; Cartesian closed categories; Product operators and others; PART II: THE CATEGORY OF CATEGORIES: Functors and categories; Natural transformations; Adjunctions; Slice categories; Mathematical foundations; PART III: TOPOSES: Basics; The internal language; A soundness proof for topos logic; From the internal language to the topos; The fundamental theorem; External semantics; Natural number objects; Categories in a topos; Topologies; PART IV: SOME TOPOSES: Sets; Synthetic differential geometry; The effective topos; Relations in regular categories; Further reading; Bibliography; Index. -

An Invitation to Applied Category Theory Cambridge University Press

A renewal of immanent metaphysics through diagrammatic methods and the tools of category theorySpinoza, Peirce and Deleuze are, in different ways, philosophers of immanence. Rocco Gangle addresses the methodological questions raised by a commitment to immanence in terms of how diagrams may be used both as tools and as objects of philosophical investigation. He integrates insights from Spinozist metaphysics, Peircean semiotics and Deleuzes philosophy of difference in conjunction

with the formal operations of category theory. Category theory reveals deep structural connections among logic, topology and a variety of different areas of mathematics, and it provides constructive and rigorous concepts for investigating how diagrams work. Gangle introduces the methods of category theory from a philosophical and diagrammatic perspective, allowing philosophers with little or no mathematical training to come to grips with this important field. This coordination of immanent metaphysics, diagrammatic method and category theoretical mathematics opens a new horizon for contemporary thought.

Category Theory for the Sciences Cambridge University Press

Monoidal category theory serves as a powerful framework for describing logical aspects of quantum theory, giving an abstract language for parallel and sequential composition, and a conceptual way to understand many high-level quantum phenomena. This text lays the foundation for this categorical quantum mechanics, with an emphasis on the graphical calculus which makes computation intuitive. Biproducts and dual objects are introduced and used to model superposition and entanglement, with quantum teleportation studied abstractly using these structures. Monoids, Frobenius structures and Hopf algebras are described, and it is shown

how they can be used to model classical information and complementary observables. The CP construction, a categorical tool to describe probabilistic quantum systems, is also investigated. The last chapter introduces higher categories, surface diagrams and 2-Hilbert spaces, and shows how the language of duality in monoidal 2-categories can be used to reason about quantum protocols, including quantum teleportation and dense coding. Prior knowledge of linear algebra, quantum information or category theory would give an ideal background for studying this text, but it is not assumed, with essential background material given in a self-contained introductory chapter. Throughout the text links with many other areas are highlighted, such as representation theory, topology, quantum algebra, knot theory, and probability theory, and nonstandard models are presented, such as sets and relations. All results are stated rigorously, and full proofs are given as far as possible, making this book an invaluable reference for modern techniques in quantum logic, with much of the material not available in any other textbook.

Topology Courier Corporation

Algebraic theories, introduced as a concept in the 1960s, have been a fundamental step towards a categorical view of general algebra. Moreover, they have proved very useful in various areas of

mathematics and computer science. This carefully developed book gives a systematic introduction to algebra based on algebraic theories that is accessible to both graduate students and researchers. It will facilitate interactions of general algebra, category theory and computer science. A central concept is that of sifted colimits - that is, those commuting with finite products in sets. The authors prove the duality between algebraic categories and algebraic theories and discuss Morita equivalence between algebraic theories. They also pay special attention to one-sorted algebraic theories and the corresponding concrete algebraic categories over sets, and to S-sorted algebraic theories, which are important in program semantics. The final chapter is devoted to finitary localizations of algebraic categories, a recent research area.

Higher Topos Theory Springer Science & Business Media

This truly elementary book on categories introduces retracts, graphs, and adjoints to students and scientists.

Fat Chance Cambridge University Press

" ... Concise explanations and descriptions - easily read and readily understood - of what we know of the chain of events and processes that connect the Sun to the Earth, with special emphasis on space weather and Sun-Climate."--Dear Reader.

Category Theory in Context Princeton University Press

Among the best available reference introductions to general topology, this volume is appropriate for advanced undergraduate and beginning graduate students. Includes historical notes and over 340 detailed exercises. 1970 edition. Includes 27 figures.

An Introduction to Functional Analysis Springer Science & Business Media

A short introduction ideal for students learning category theory for the first time.

Knot Theory and Its Applications MIT Press

New and classical results in computational complexity, including interactive proofs, PCP, derandomization, and quantum computation. Ideal for graduate students.

Basic Category Theory for Computer Scientists Cambridge University Press

Well-written and engaging, this hands-on approach features many exercises to be completed by readers. Topics include knot definition and equivalence, combinatorial and algebraic invariants, unknotting operations, and virtual knots. 2016 edition.

Categories for Types Oxford University Press

Over 140 examples, preceded by a succinct exposition of general topology and basic terminology. Each example treated as a whole. Numerous problems and exercises correlated with examples. 1978 edition. Bibliography.

Categories for the Working Mathematician

Courier Dover Publications
Comprehensive textbook on phonetics, with examples from over 500 languages.

Introduction to Art: Design, Context, and Meaning Cambridge University Press
A wide coverage of topics in category theory and computer science is developed in this text, including introductory treatments of cartesian closed categories, sketches and elementary categorical model theory, and triples. Over 300 exercises are included.

Elementary Categories, Elementary Toposes Cambridge University Press
Type theory is a fast-evolving field at the crossroads of logic, computer science and mathematics. This gentle step-by-step introduction is ideal for graduate students and researchers who need to understand the ins and outs of the mathematical machinery, the role of logical rules therein, the essential contribution of definitions and the decisive nature of well-structured proofs.

The authors begin with untyped lambda calculus and proceed to several fundamental type systems, including the well-known and powerful Calculus of Constructions. The book also covers the essence of proof checking and proof development, and the use of dependent type theory to formalise mathematics. The only prerequisite is a basic knowledge of undergraduate mathematics. Carefully chosen examples illustrate the theory throughout. Each chapter

ends with a summary of the content, some historical context, suggestions for further reading and a selection of exercises to help readers familiarise themselves with the material.

Elements of ∞-Category Theory Courier Dover Publications

This book develops abstract homotopy theory from the categorical perspective with a particular focus on examples. Part I discusses two competing perspectives by which one typically first encounters homotopy (co)limits: either as derived functors definable when the appropriate diagram categories admit a compatible model structure, or through particular formulae that give the right notion in certain examples. Emily Riehl unifies these seemingly rival perspectives and demonstrates that model structures on diagram categories are irrelevant. Homotopy (co)limits are explained to be a special case of weighted (co)limits, a foundational topic in enriched category theory. In Part II, Riehl further examines this topic, separating categorical arguments from homotopical ones. Part III treats the most ubiquitous axiomatic framework for homotopy theory - Quillen's model categories. Here, Riehl simplifies familiar model categorical lemmas and definitions by focusing on weak factorization systems. Part IV introduces quasi-categories and homotopy coherence.

Diagrammatic

Immanence Courier Corporation
This textbook explains the basic principles of categorical type theory and the techniques used to derive categorical semantics for specific type theories. It introduces the reader to ordered set theory, lattices and domains, and this material provides plenty of examples for an introduction to category theory, which covers categories, functors, natural transformations, the Yoneda lemma, cartesian closed categories, limits, adjunctions and indexed categories. Four kinds of formal system are considered in detail, namely algebraic, functional, polymorphic functional, and higher order polymorphic functional type theory. For each of these the categorical semantics are derived and results about the type systems are proved categorically. Issues of soundness and completeness are also considered. Aimed at advanced undergraduates and beginning graduates, this book will be of interest to theoretical computer scientists, logicians and mathematicians specializing in category theory.
Conceptual Mathematics Good Press
Accessible text covering core functional analysis topics in Hilbert and Banach spaces, with detailed proofs and 200 fully-worked exercises.
An Introduction to Category Theory MIT Press
Designed for the intellectually curious, this

book provides a solid foundation in basic probability theory in a charming style, without technical jargon. This text will immerse the reader in a mathematical view of the world, and teach them techniques to solve real-world problems both inside and outside the casino.

Algebraic Theories
Cambridge University Press
This introduction to algebraic number theory via the famous problem of "Fermats Last Theorem" follows its historical development, beginning with the work of Fermat and ending with Kummers theory of "ideal" factorization. The more elementary topics, such as Eulers proof of the impossibilty of x+y=z, are treated in an uncomplicated way, and new concepts and techniques are introduced only after having been motivated by specific problems. The book also covers in detail the application of Kummers theory to quadratic integers and relates this to Gauss'theory of binary quadratic forms, an interesting and important connection that is not explored in any other book.

The Sun, the Earth, and Near-earth Space
Springer
This book introduces the study of knots, providing insights into recent applications in DNA research and graph theory. It sets forth fundamental facts such as knot diagrams, braid representations, Seifert surfaces, tangles, and Alexander polynomials. It also covers more recent

developments and special topics, such as chord diagrams and covering spaces. The author avoids advanced mathematical terminology and intricate techniques in algebraic topology and group theory. Numerous diagrams and exercises help readers understand and apply the theory. Each chapter includes a supplement with interesting historical and mathematical comments.