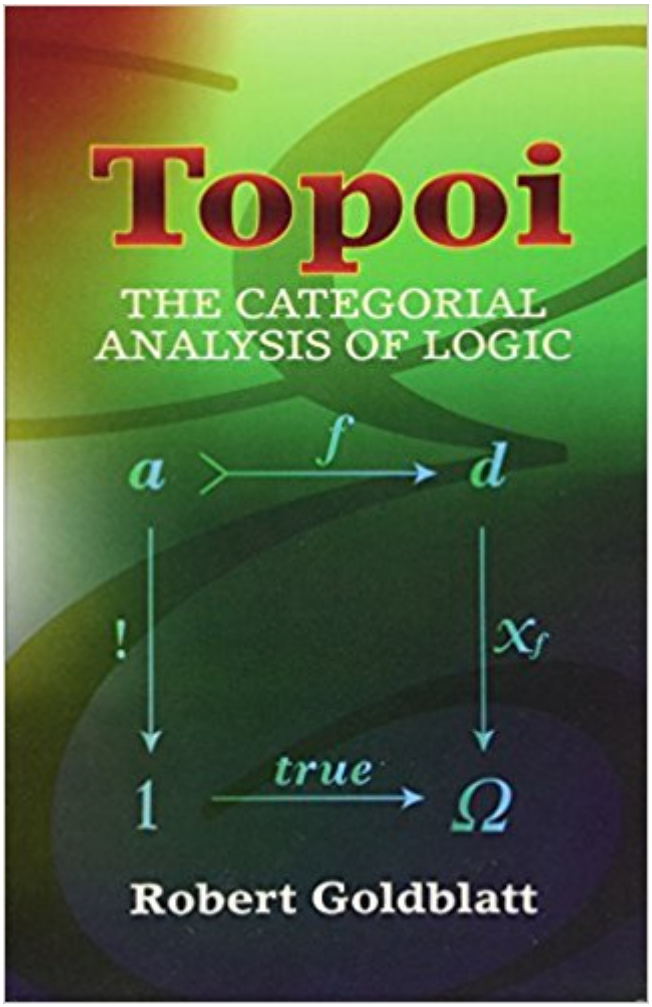
Topoi: The Categorial Analysis Of Logic (Dover Books On Mathematics)



Synopsis

A classic introduction to mathematical logic from the perspective of category theory, this text is suitable for advanced undergraduates and graduate students and accessible to both philosophically and mathematically oriented readers. Its approach moves always from the particular to the general, following through the steps of the abstraction process until the abstract concept emerges naturally.Beginning with a survey of set theory and its role in mathematics, the text proceeds to definitions and examples of categories and explains the use of arrows in place of set-membership. The introduction to topos structure covers topos logic, algebra of subobjects, and intuitionism and its logic, advancing to the concept of functors, set concepts and validity, and elementary truth. Explorations of categorial set theory, local truth, and adjointness and quantifiers conclude with a study of logical geometry.

Book Information

Series: Dover Books on Mathematics

Paperback: 592 pages

Publisher: Dover Publications; Revised ed. edition (April 28, 2006)

Language: English

ISBN-10: 0486450260

ISBN-13: 978-0486450261

Product Dimensions: 5.5 x 1.1 x 8.5 inches

Shipping Weight: 1.3 pounds (View shipping rates and policies)

Average Customer Review: 4.7 out of 5 stars 8 customer reviews

Best Sellers Rank: #599,631 in Books (See Top 100 in Books) #195 inÃ Â Books > Science & Math > Mathematics > Pure Mathematics > Number Theory #245 inÃ Â Books > Science & Math > Mathematics > Pure Mathematics > Algebra > Linear #287 inÃ Â Books > Science & Math > Mathematics > Pure Mathematics > Logic

Customer Reviews

This is an interesting addition to the field that was well ahead of the pack. Not as well written as Lawvere’s later "Conceptual Mathematics" it covers more territory and becomes quite dense in its development of category theory which is now well established applied mathematics whose pure roots in sets is still evident.

I bought this book because I was interested in applying topos theory to quantum mechanics but I

had no knowledge of category theory. Looking for books on this seemed to me perfect because it not only explains topos theory but also offers an introduction to category theory. This introduction can be followed without problems for those who had no prior knowledge of category theory, in addition the book's style is clear and concise, motivating each concept introduced. Of course you can not read it like a novel, the reader must work each example and exercise to gain mastery over the issues.

I have only read the first seventy pages of this book, but so far it is excellent. The character of the book can be likened to Kleene's "Introduction to Metamathematics" or "Mathematical Logic." The subject is well motivated by brief philosophical discussions, but the philosophy is not allowed to interrupt the flow of mathematical development. There are few exercises, but enough for the casual reader to check from time to time that he or she is understanding the material. The exposition itself is perfectly clear and concise, by my lights. Nothing important is skipped--one does not need to fill in the blanks in proofs--yet the book moves at a good pace. The focus of the book is on the development of Category theory in relation to its applications in logic. For this reason it is probably of more interest to a logician or a philosopher than to a computer scientist. Indeed, for the logician who is interested in Category theory this book cannot be missed. To put it bluntly, Goldblatt strikes me as a superior mind, even his brief remarks on set theory were enlightening. The book has been (to this point, at least) a very enjoyable read.

Great Product!

very well written book starts with nontechnical chapters to technical ones. I would recommend this book as an advanced reading for students and researchers in the field of philosophy of mathematics and foundations of mathematics and logic.

Category theory, the alternative foundation for mathematics which privileges transformations over elements, has grown in importance and cachet in recent decades; however, for the average reader with intellectual interests the texts which treat of it have remained books with seven seals, containing seemingly-indecipherable "diagrams" not quite explaining the "abstract nonsense" (a term of approval among category theorists). Bricoleurs rejoice -- the second edition of Robert Goldblatt's *Topoi: The Categorial Analysis of Logic*, originally published by North-Holland in 1984, is available in an affordable Dover edition and is well worth your time. Like your usual North-Holland

text, this is a book in *pure logic*: the "topos" (discovered by F. William Lawvere in the ’60s) is the category which has the structure necessary to model quantificational logic, and Goldblatt’s goal is to make the discoveries of Lawvere and others in this area available to people with a standard training in logical methods.Unlike your usual North-Holland book, *Topoi* contains well-paced introductions to all related topics, including basic category theory: I have never seen an introduction to category-theoretic "diagrams" which is as easy to follow, and I think those with previous logic training will agree. If you find Boolean algebras and "characteristic functions" natural, then Goldblatt’s gradual introduction of categories that "parallel" logical structure will reinforce your understanding of logic and deepen your understanding of the related mathematics. The interesting fact about topos theory as a "model" for logic is that it does not privilege "classical" logic: the underlying logic of topoi is actually *intuitionistic*, and those with interests in intuitionism will be excited by what transpires in the book.Not only them, though: repeatedly throughout the later chapters of the book Goldblatt stresses the relevance of the results proved about intuitionism to *modal* logic, closely related through the "S4 translation" and the twinned Kripke semantics for intuitionism and modal logics. Philosophers tend to view "frame semantics" for modal logics as an unreasonably useful artifact delivered unto them by Providence, and thinking about its generalization using the idea of a "sheaf" will do them good. The book isn’t absolutely everything it could be: "working mathematicians" will still need to look at Mac Lane or Steve Awodey’s more recent *Category Theory* for the whole story, and computer scientists will find *Topoi* merely interesting (the connection between "cartesian closed categories" and effective computability, the fulcrum of category theory for CS, goes completely unremarked upon). However, for those looking for a "starting-point" with category theory this is definitely a good one.

When Goldblatt’s book first hit the stands, it was blasted by reviewers who had a geometric predilection. They claimed that Goldblatt had trivialized this essentially rich geometric subject by giving a set-theoretic treatment.I became fascinated with topos theory in the summer of 1989. My only experience with category theory at that time was some dabbling that every graduate student gets in studying modules and in functional analysis. I didn’t have much background in algebraic topology where the subject is usually developed considerably further.Frankly, I found Goldblatt’s "gentle" approach to categorical concepts and the concept of a topos very rewarding. I worked through most of the book in a summer, and was fully prepared to take on the more advanced texts at that point. Later, I had the opportunity to teach topos theory at the graduate level to people with backgrounds similar to mine (i.e., without a strong background in category theory). We worked

through most of Goldblatt's book in the first semester and I guarantee that all the students were very grateful, as I had been, for Goldblatt's approach to the subject.The book is well written, accessible to graduate students, filled with fun and often challenging exercises, and packed with references. In my opinion, it is the right place to start if you want to become proficient in topos theory (and you don't already have significant proficiency in category theory).

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