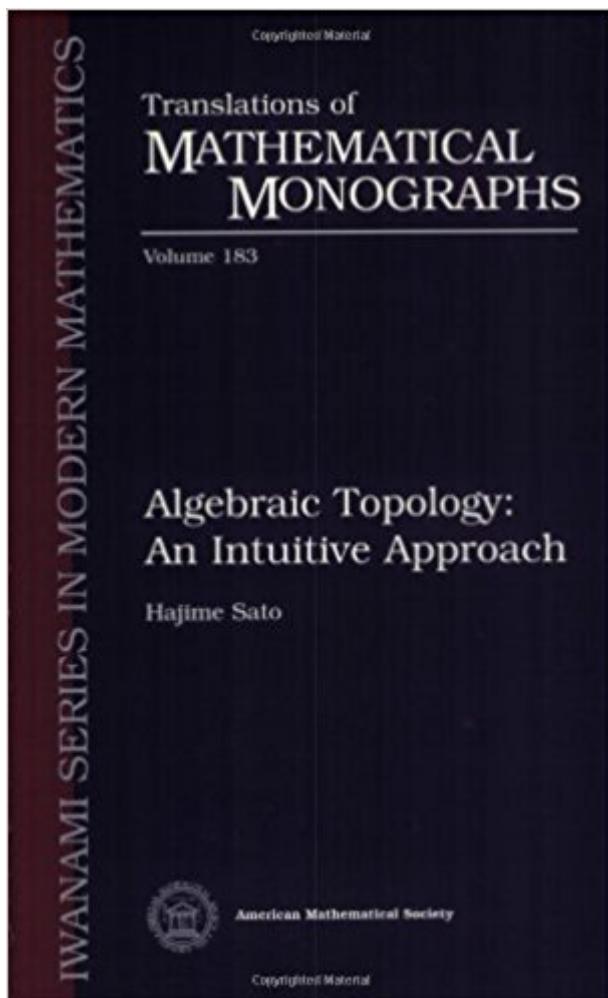


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# Algebraic Topology: An Intuitive Approach (Translations Of Mathematical Monographs, Vol. 183)



## Synopsis

The single most difficult thing one faces when one begins to learn a new branch of mathematics is to get a feel for the mathematical sense of the subject. The purpose of this book is to help the aspiring reader acquire this essential common sense about algebraic topology in a short period of time. To this end, Sato leads the reader through simple but meaningful examples in concrete terms. Moreover, results are not discussed in their greatest possible generality, but in terms of the simplest and most essential cases. In response to suggestions from readers of the original edition of this book, Sato has added an appendix of useful definitions and results on sets, general topology, groups and such. He has also provided references. Topics covered include fundamental notions such as homeomorphisms, homotopy equivalence, fundamental groups and higher homotopy groups, homology and cohomology, fiber bundles, spectral sequences and characteristic classes. Objects and examples considered in the text include the torus, the Möbius strip, the Klein bottle, closed surfaces, cell complexes and vector bundles.

## Book Information

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## Customer Reviews

... Sato's book is a gem, and I am happy to recommend it in very enthusiastic terms. --MAA

Reviews This is an uncommon book with an interesting idea behind it, which is given in its title: to give an intuitive approach to algebraic topology. Instead of stating theorems in full generality or proving them rigorously with all technical details (or proving them at all), the author rather tries to make the reader familiar with "the idea" of the central notions of algebraic topology. --Zentralblatt MATH A nice supplement for a topology course. --American Mathematical Monthly

Text: English (translation) Original Language: Japanese

When I chose this book, it was because I wanted to review algebraic topology. This kind of study is a valuable experience, since each of specialists has his own point of view on his subject. For example, if you climb a mountain and somebody who already climbed on the top of the mountain briefly tells you about what he has seen, it will be helpful to you. The best merit of the book is, first, it has only about 100 pages, and second, the author introduces algebraic topology from the basic definitions of algebraic topology to characteristic classes. In Preface, he emphasized that to read this book, you don't need to have the experience to study topology. He seemed confident about this. But to me, that's unrealistic. First of all, it has many typos, especially in basic definitions and examples. If readers have not studied algebraic topology before, it seems impossible to understand. I would give this book only three stars because typos abound, making many important places incomprehensible to readers who are naive of the subject. Anyway, I am content with the book, because I become more familiar with the concepts of fiber bundles, vector bundles, characteristic classes, spectral sequences, and I come to have my own image on these concepts. Overall, the book is very well-organized and the author chose a right path in making the book comprehensible to undergraduate students. If there were only a few and minor typos, I would have given this book five stars.

In my opinion, this is a great little book to take with you to a park or on a trip to read before you start tackling a more serious book such as the one by Allen Hatcher. This book will give you a great overview of many major topics in Algebraic Topology; for a serious reader, you might want to read this book in parallel with Hatcher, Massey and Munkres (Topology, 2nd Edition). I find that these three books compliment one another very well if you are trying to learn this beautiful subject on your own. I use Sato's book to read about general ideas; once I understand the surface of the concepts I then reference the latter two books to dive deeper into the machinery. It's working well for me; however, do not be fooled, nothing replaces a great teacher!

This was my first crack at algebraic topology, self-studying long after my university days. I thought I'd read this book as a warm-up for Bott & Tu. The book is written in the laid-back discursive style that is one of the more charming attributes of Japanese math books. It's also short, and the author has provided solutions or hints for most of the modest exercises. At first glance it looks like a

pleasant way to spend a few afternoons in a cafe. But appearances can be deceiving. The intuitions referred to are not those of a typical beginner. No less disingenuous is the occasional advice saying it's OK to skip a chapter: the concepts and definitions are inevitably used in later ones. These are what Japanese call "tatemae" -- the stuff that's said just for the sake of making a good (or at least better) impression. The reviewers who suggested that the book supplements more advanced texts are closer to the mark. I found myself resorting to Bott & Tu and Hatcher to clear up concepts presented in this one, when I'd expected the reverse. E.g., Sato's explanation of exact sequences was ultra-concise and rather puzzling, while the two books I mentioned and even Wikipedia are quite helpful about them. B&T also uses many more diagrams when it counts, including in some clear and beautiful proofs about homotopies that Sato presents in a drier style. Nor does Sato do a good job of motivating why cohomology is more useful than homology; for all its shortcomings (including lack of coverage of De Rham cohomology), even 1970's-vintage Maunder does a better job at this. (The first few pages of Hatcher's Chapter 3 are even better on that point, but that's what one would expect from such a humongous book.) And the diagrams accompanying the description of fiber bundles don't even indicate a fiber; there are many more "intuitive" explanations of this topic elsewhere. This may be a good tool for reinforcing material you have learnt or are learning from another source. But you might not find it as suitable for a free-standing introduction as the title and a casual inspection might suggest. I give it 3.5-4 stars instead of 3 as a handicap, considering my own amateurism, and also because of the good range of topics touched on.

This modest 118-page book would best accompany one of the standard graduate texts -- Spanier, Dold, Switzer, Massey, Husemoller, Maunder, Munkres, Bott and Tu, Bredon, or Greenberg and Harper. It can't be used as a text. The book presents the most basic ideas pertaining to homotopy, homology, cohomology, fibre bundles, spectral sequences, and characteristic classes. The emphasis is on simple examples and simple calculations to demonstrate what is going on. Rigorous definitions, proofs, and even frequently even the statements of theorems, are avoided. One good aspect of the treatment is the axiomatic presentation of homology and cohomology a la Eilenberg and Steenrod. Some of the essential material is also presented, e.g. the cup product that gives a ring structure to the cohomology group, the Künneth theorem, the Universal Coefficient theorem, and so on. The book would afford a bird's-eye view, a conspectus, to a bright undergraduate or beginning graduate student. It goes without saying, of course, that this is for motivation, and it doesn't replace the hard technical grind required to master the subject. The book suffers in comparison to the one by Fomenko, Fuchs and Gutenmacher (Homotopic Topology), but that, alas,

can't be had for love or money.

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