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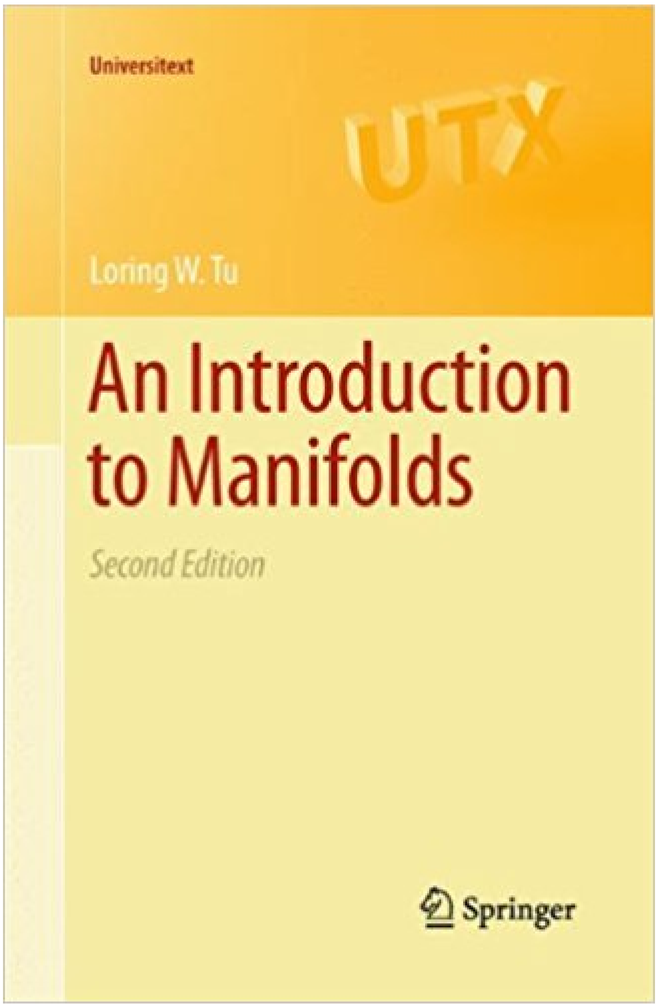

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Synopsis

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'.

Book Information

Series: Universitext

Paperback: 410 pages

Publisher: Springer; 2nd ed. 2011 edition (October 6, 2010)

Language: English

ISBN-10: 1441973990

ISBN-13: 978-1441973993

Product Dimensions: 6.1 x 1 x 9.2 inches

Shipping Weight: 1.7 pounds (View shipping rates and policies)

Average Customer Review: 4.7 out of 5 stars   19 customer reviews

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Customer Reviews

From the reviews of the second edition:â œThis book could be called a prequel to the book â ˆDifferential forms in algebraic topologyâ ™ by R. Bott and the author. Assuming only basic background in analysis and algebra, the book offers a rather gentle introduction to smooth manifolds and differential forms offering the necessary background to understand and compute deRham cohomology. â | The text also contains many exercises â | for the ambitious reader.â • (A. Cap, Monatshefte fÃ r Mathematik, Vol. 161 (3), October, 2010)

Manifolds, the higher-dimensional analogues 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 second edition contains fifty pages of new material. Many passages have been rewritten, proofs simplified, and new examples and exercises added. This work may be used as a textbook for a one-semester graduate or advanced undergraduate course, as well as by students engaged in self-study. The requisite point-set topology is included in an appendix of twenty-five pages; other appendices review facts from real analysis and linear algebra. Hints and solutions are provided to many of the exercises and problems. Requiring only minimal undergraduate prerequisites, "An Introduction to Manifolds" is also an excellent foundation for the author’s publication with Raoul Bott, "Differential Forms in Algebraic Topology."

This is an excellent book for what it is. A gentle yet rigorous introduction to the subject. I like the careful handling of various notion of orientation, the introduction to category theory which is unusual for a book of this level. An as others have pointed out, it is a good book for Bott and Tu’s book on differential forms which is horrible in terms of introducing basic concepts.Some complain that the book is dry. It is somewhat dry, yes but that makes the book concise; think of it as learning the alphabet before you being to poetry. It is one of the best books in its category ;)

It’s a very nice text. Exact and closed definitions, clear derivations of propositions and theorems. This work may be used as a textbook anybody who are interesting in different aspect of topology, abstract algebra and manifold.

i think there is a jump from ugrad analysis/alg/top etc to early grad school concepts. i didnt know category theory, i only had the flimsiest notion of a manifold, etc etc. and this book fills in that jump wonderfully. it does the right mix of analysis-differential topology-topology so that you can go read a book like bott and tu later (that's what it was designed for).so im having a good time with it.

Manifolds are natural generalizations of smooth surfaces. Differential forms nicely summarize what kind of integrations are possible over a manifold. Stokes theorem is a beautiful generalization of classical theorems of vector analysis.In vector analysis, one meets the fact that whether a curl-free vector field has a potential or not in a specific domain depends on the topological properties of the domain (on simple-connectedness). This problem nicely generalizes to De Rham theory.Tu's book is a friendly and smooth introduction to these topics and more. I can recommend it to any student of mathematics who likes beautiful general mathematical concepts and has the patience and enthusiasm to understand a large number of definitions that this theory requires.

Very good and easy to get idea.

When I first began reading the text, I had a difficult time understanding the concepts, but the presentation of the material really laid bare all of the esoteric topics that I hadn't encountered formally before.Loring Tu has done an excellent job of making sure even the uninitiated student can make his/her way through this text, having sprinkled a few easy exercises through the text itself to emphasize the learning and familiarity with definitions, with more difficult exercises at the end (including computations as well as topics that force a student to understand and digest the section immediately preceding the problems). He labels every problem, so a student doesn't wade through pages of text needlessly trying to discover which part of the text will be most useful, but this method allows the student to hone in on the material which is exactly pertinent to that problem. I am by far not the best and brightest student, but I have been able to read the text and given a few hours for each section, complete all exercises throughout the reading and at the end of the section. With many hints and solutions at the end of the textbook, I can be sure I'm not only learning the material, I'm learning it correctly!I would agree with some of the other reviewers that this should be a text every graduate student in mathematics should read. It is not out of the realm of possibilities for a student to read it on his/her own, and the enlightenment gained from the generalizations of multivariate calculus is really a gift to oneself, as well as to any future students the person may have, for they will be able to answer any up-and-coming student's questions with a clarity surpassing any instructor I've personally had, which would have been very helpful as a budding mathematician.

This past year I took my first manifold theory/differential geometry course. We used John Lee's Introduction to Smooth Manifolds and the terse encyclopedic nature of the book didn't really help me understand what the professor was saying. Luckily, I found Loring Tu's book which gives a gentler introduction to the subject. Loring Tu's book has many computational examples and easy to medium level exercises, which are essential because of the onslaught of notation one encounters in manifold theory.I've been able to compare this book with John Lee's Introduction to Smooth Manifolds, which seems to be one of the standard texts for an introductory geometry course. My guess is that when Mr. Tu was writing his book, he started with John Lee's book and got rid of all of the obscure and difficult examples. He then expanded out the important essential ones in more detail so that a student who has never seen manifold theory would have a better chance of understanding.

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