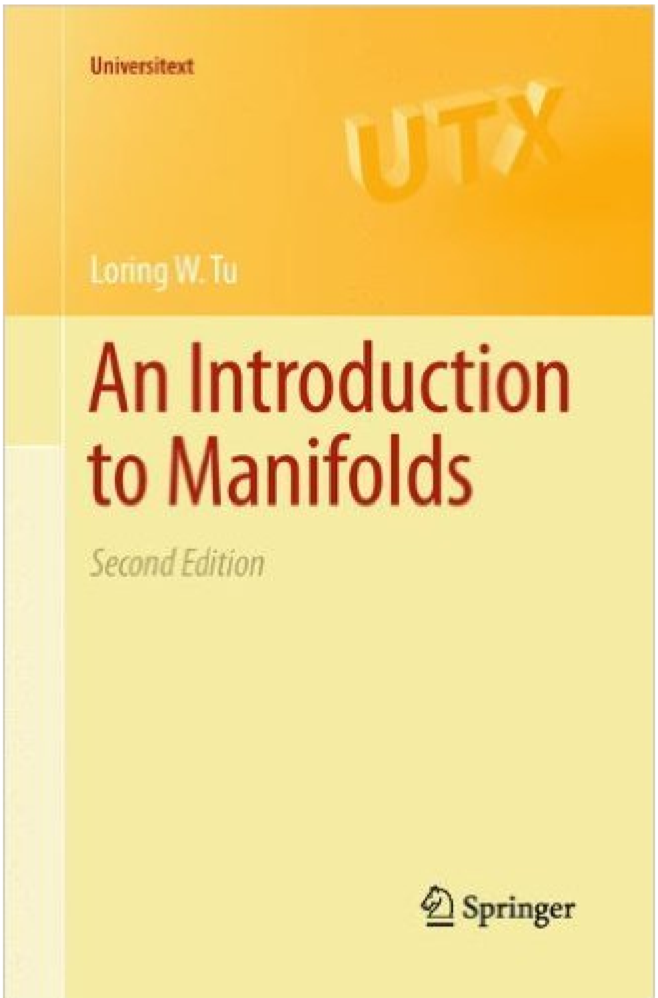
An Introduction To Manifolds (Universitext)



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: 4.8 out of 5 starsÂ Â See all reviewsÂ (17 customer reviews)

Best Sellers Rank: #29,328 in Books (See Top 100 in Books) #3 inÂ Books > Science & Math > Mathematics > Geometry & Topology > Topology #4 inÂ Books > Science & Math > Mathematics > Geometry & Topology > Differential Geometry #9 inÂ Books > Textbooks > Science & Mathematics > Mathematics > Geometry

Customer Reviews

This is my favorite book on Differentiable Manifolds. After reading this book the reader will obtain a solid background on the following essential notions: Charts and atlas of a manifold; tangent vectors (as derivations); differential of a smooth function between manifolds; submanifolds and embeddings;

quotient spaces; partitions of unity; vector fields; vector bundles; differential forms and de Rham cohomology. And on the road, the reader gets a gentle exposure to Lie groups, Lie algebras; and some basic notion of Category and Functors.I found the following aspects of the book especially attractive:> Clear style of writing: The author is the coauthor of the acclaimed "Differential Forms in Algebraic Topology". See the comments for that book. The clarity has not decreased at all.> Bite-sized sections: The materials contained in each section is approximately equal to that of a 50-minute lecture. This helps readers who plan self-study.> Right amount of topics: This is not an encyclopedia on manifolds. However, it does contain the ``absolute must'' one should know about manifolds. And it does such a good job in presenting it, the reader will be left with a solid understanding on those essential topics.I first read this book as a Physics student and had no trouble reading it. I later switched discipline to Mathematics, and I know that this book has helped me appreciate the beauty of Mathematics. I thank the author for writing such an wonderful book.

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.

This is an excellent book. I wish that more books on advanced mathematics were written in this style. In contrast to most books on manifolds that tend to be very difficult for beginners to follow, Prof. Tu has made every effort to make this subject understandable to the nonexpert.Greg ChirikjianProfessor, Mechanical EngineeringJohns Hopkins University

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.

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.

This book is an excellent introduction to smooth manifolds. After reading this book and working through some of the exercises you will have a basic understanding of the language of smooth manifolds and be well prepared to delve into any number of topics including Riemannian geometry, Morse theory, symplectic geometry, contact geometry, Lie groups and algebras, and more advanced algebraic topology. Due to its clarity and the fact that it is fairly self-contained I found it well suited for self-study. In addition I quite appreciated how the book covers some algebra and provides definitions of things like algebras and modules. I also found the appendix on point-set topology to be quite useful.

Manifolds (Graduate Texts in Mathematics) Riemannian Manifolds: An Introduction to Curvature (Graduate Texts in Mathematics) Manifolds, Tensors, and Forms: An Introduction for Mathematicians and Physicists Geodesic and Horocyclic Trajectories (Universitext) Motivic Homotopy Theory: Lectures at a Summer School in Nordfjordeid, Norway, August 2002 (Universitext) Lectures on Hyperbolic Geometry (Universitext) Matrix Theory: Basic Results and Techniques (Universitext) Groups and Symmetries: From Finite Groups to Lie Groups (Universitext) Lie Groups: An Approach through Invariants and Representations (Universitext) Dynamical Systems: Examples of Complex Behaviour (Universitext) Tensor Analysis on Manifolds (Dover Books on Mathematics) An Introductory Course on Differentiable Manifolds (Aurora: Dover Modern Math Originals) Analysis On Manifolds (Advanced Books Classics) Topology of Surfaces, Knots, and Manifolds