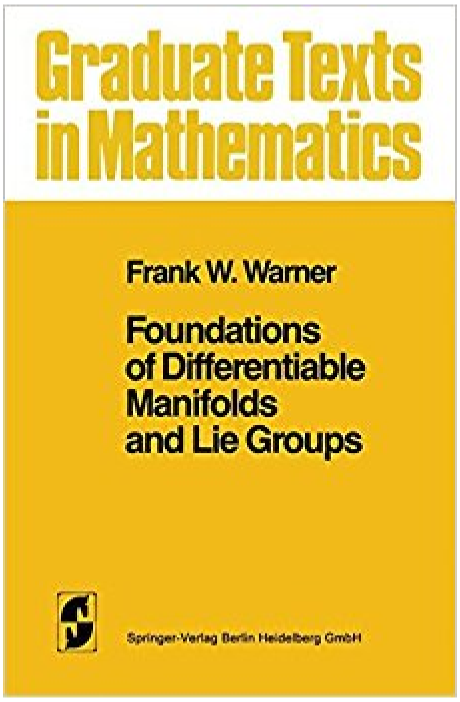
Foundations Of Differentiable Manifolds And Lie Groups (Graduate Texts In Mathematics) (v. 94)



Synopsis

Foundations of Differentiable Manifolds and Lie Groups gives a clear, detailed, and careful development of the basic facts on manifold theory and Lie Groups. Coverage includes differentiable manifolds, tensors and differentiable forms, Lie groups and homogenous spaces, and integration on manifolds. The book also provides a proof of the de Rham theorem via sheaf cohomology theory and develops the local theory of elliptic operators culminating in a proof of the Hodge theorem.

Book Information

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Customer Reviews

This is an incredible textbook. Great for graduate students who have taken a course in vector calculus of differentiable topology. Not heavy on structure theorems or representation theory but fantastic for basics of Lie groups.

If you are looking for a great reference for differentiable manifolds this is it! Be careful though it is dense at times.

Very well job done.

This is my first and my last kindle edition purchase. The book was traslated without any care about mathematical notations. The paper edition is fine, kindle edition is very very bad.

It's a classic book. A reference in Lie groups.

This concise book is invaluable and a true reference to start with manifolds. It concentrates a broad amount of advanced topics in only 250 pages: atlas and manifolds,inmersed and imbedded submanifolds, Frobenius theorem on completely integrable tangent subbundles (made with exterior forms and also with vector fields), a solid (though somewhat idyosincratic) introduction to Lie groups, Stoke's theorem, de Rham theorem on cohomology (made with sheafs) and an introduction to harmonic forms and Hodge theory (a topic covered in an English textbook for the first time). Chapters one and two are particularly dry. People complain saying it's a hard-to-read book. But for beginners no book on manifolds is easy. I particularly found difficult to study this one (it was many years ago, on its Scott, Foresman and Company first edition, 1971). I was acquainted with Singer-Thorpe's Lecture Notes on Elementary Topology and Geometry, Willmore's An Introduction to Differentiable Geometry and Spivak's Calculus on Manifolds, but I had to work very hard to progress along Warner's dense and detailed pages, written with little attention to sources, history or applications. However, this work wonderfully dealt with so many interesting and foundational material! and it covered such a wide range of information with much accuracy! At that time, there were only a handful of books in the same spirit that Warner's: Differentiable Manifolds by Aulander-MacKenzie, Differentiable Manifolds by S. T. Hu and Tensor Analysis on Manifolds by Bishop-Goldberg. Both Hu's and Warner's helped to link a typical course on curves and surfaces with advanced books on Geometry or Topology, like Kobayashi-Nomizu's Foundations of Differential Geometry, Bishop-Crittenden's Geometry of Manifolds, Sternberg's Differential Geometry or Hirsch's Differential Topology. Nowadays there are a host of books on manifolds, some less demanding than Warner's, (f. ex. Boothby's An Introduction to Differentiable manifolds and Riemannian Geometry), some much more sophisticated (f. ex. Nicolaescu's Lectures on the Geometry of Manifolds). A very good alternative is Differentiable Manifolds by L. Conlon. Anyway, I think that several good books are better than one, and one should add a companyon to Warner's in order to get complementary information on complex manifolds, Lie groups, homogeneous spaces, bundles and connections (gauge theory!), characteristic classes on so on. For that, Poor's Differential Geometric Structures is very good indeed. Of course, Spivak's "A Comprehensive Introduction to Differential Geometry (vol. 1) complements Warner's particularly well.

This is a solid introduction to the foundations (and not just the basics) of differential geometry. The author is rather laconic, and the book requires one to work through it, rather than read it. It presupposes firm grasp of point-set topology, including paracompactness and normality. The basics (Inverse and Implicit Function Theorems, Frobenius Theorem, orientation, and rudiments of de Rham cohomology) are covered in about 100 pages (Chapters 1, 2, and 4). This is not really suitable for an undergraduate course in differential geometry, but is great for a graduate course.Chapter 3, 5, and 6 (self-contained introductions to Lie Groups, Sheaf Theory, and Hodge Theory, all from a geometric viewpoint) are a really nice feature. The book can't be covered in one semester, but these chapters are great for selft-study. In fact, the organization of Chapter 5 is more suitable for self-study than for being taught in class (lots of theory developed first, with all applications delayed until the end). The real jewel of the book is Chapter 6, a very clean introduction to Hodge Theory, with immediate applications.The main drawback of the book in my view is that the author avoids vector bundles like the plague. These could have been very nicely incorporated into the book. No mention is made of Mayer-Vietoris or Kunneth formula, even though the former follows easily from the section on cochain complexes in Chapter 5 and the latter with some effort from Chapter 6. There is no mention of manifolds with boundary either, except as regular domains of manifolds for the purpose of Stokes Theorem.The organization of the book could have been better as well. In particular, the section on cochain complexes could have been incorporated in the rather short de Rham Cohomology Chapter 4, so that MV could have been proved and used to compute the cohomology of spheres (beyond the circle). Some subsections, including in Chapter 1, appear out of order to me. There is a shortage of exercises in my view. Some of the author's notation (for tangent spaces, tangent bundles) is rather non-standard.However, all-in-all, I can't think of a better differential geometry text for a graduate course. Spivak and Lee are quite wordy and do not have the same breadth. Either book would be preferable to Warner for an undergraduate course though. The price is a relative bargain too.

This book is superb at the graduate level. If you are an ambitious undergraduate, start with "Differential Forms, a Complement to Vector Calculus" by Steven H. Weintraub and "Calculus on Manifolds" by Michael Spivak. Proceed to "Lecture Notes on Elementary Topology and Geometry" by Singer and Thorpe. Then read this book. It's the real deal!

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