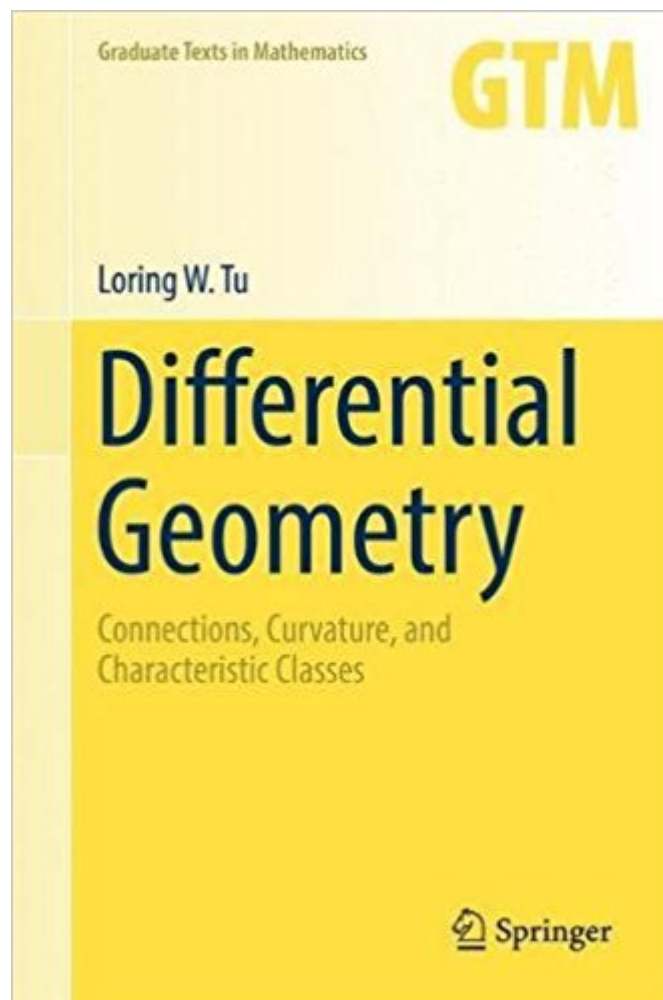




The book was found

# Differential Geometry: Connections, Curvature, And Characteristic Classes (Graduate Texts In Mathematics)



## Synopsis

This text presents a graduate-level introduction to differential geometry for mathematics and physics students. The exposition follows the historical development of the concepts of connection and curvature with the goal of explaining the Chern–Weil theory of characteristic classes on a principal bundle. Along the way we encounter some of the high points in the history of differential geometry, for example, Gauss' Theorema Egregium and the Gauss–Bonnet theorem. Exercises throughout the book test the reader's understanding of the material and sometimes illustrate extensions of the theory. Initially, the prerequisites for the reader include a passing familiarity with manifolds. After the first chapter, it becomes necessary to understand and manipulate differential forms. A knowledge of de Rham cohomology is required for the last third of the text. Prerequisite material is contained in author's text *An Introduction to Manifolds*, and can be learned in one semester. For the benefit of the reader and to establish common notations, Appendix A recalls the basics of manifold theory. Additionally, in an attempt to make the exposition more self-contained, sections on algebraic constructions such as the tensor product and the exterior power are included. Differential geometry, as its name implies, is the study of geometry using differential calculus. It dates back to Newton and Leibniz in the seventeenth century, but it was not until the nineteenth century, with the work of Gauss on surfaces and Riemann on the curvature tensor, that differential geometry flourished and its modern foundation was laid. Over the past one hundred years, differential geometry has proven indispensable to an understanding of the physical world, in Einstein's general theory of relativity, in the theory of gravitation, in gauge theory, and now in string theory. Differential geometry is also useful in topology, several complex variables, algebraic geometry, complex manifolds, and dynamical systems, among other fields. The field has even found applications to group theory as in Gromov's work and to probability theory as in Diaconis's work. It is not too far-fetched to argue that differential geometry should be in every mathematician's arsenal.

## Book Information

Series: Graduate Texts in Mathematics (Book 275)

Hardcover: 347 pages

Publisher: Springer; 1st ed. 2017 edition (June 7, 2017)

Language: English

ISBN-10: 3319550829

ISBN-13: 978-3319550824

Product Dimensions: 6.6 x 1 x 9.4 inches

Shipping Weight: 1.2 pounds (View shipping rates and policies)

Average Customer Review: 5.0 out of 5 stars 2 customer reviews

Best Sellers Rank: #500,205 in Books (See Top 100 in Books) #55 in [Books > Science & Math > Mathematics > Geometry & Topology > Differential Geometry](#) #70 in [Books > Science & Math > Mathematics > Geometry & Topology > Algebraic Geometry](#) #289 in [Books > Textbooks > Science & Mathematics > Mathematics > Geometry](#)

## Customer Reviews

This text presents a graduate-level introduction to differential geometry for mathematics and physics students. The exposition follows the historical development of the concepts of connection and curvature with the goal of explaining the Chern-Weil theory of characteristic classes on a principal bundle. Along the way we encounter some of the high points in the history of differential geometry, for example, Gauss' Theorema Egregium and the Gauss-Bonnet theorem. Exercises throughout the book test the reader's understanding of the material and sometimes illustrate extensions of the theory. Initially, the prerequisites for the reader include a passing familiarity with manifolds. After the first chapter, it becomes necessary to understand and manipulate differential forms. A knowledge of  $\mathbb{R}$ -de Rham cohomology is required for the last third of the text. Prerequisite material is contained in author's text *An Introduction to Manifolds*, and can be learned in one semester. For the benefit of the reader and to establish common notations, Appendix A recalls the basics of manifold theory. Additionally, in an attempt to make the exposition more self-contained, sections on algebraic constructions such as the tensor product and the exterior power are included. Differential geometry, as its name implies, is the study of geometry using differential calculus. It dates back to Newton and Leibniz in the seventeenth century, but it was not until the nineteenth century, with the work of Gauss on surfaces and Riemann on the curvature tensor, that differential geometry flourished and its modern foundation was laid. Over the past one hundred years, differential geometry has proven indispensable to an understanding of the physical world, in Einstein's general theory of relativity, in the theory of gravitation, in gauge theory, and now in string theory. Differential geometry is also useful in topology, several complex variables, algebraic geometry, complex manifolds, and dynamical systems, among other fields. The field has even found applications to group theory as in Gromov's work and to probability theory as in Diaconis's work. It is not too far-fetched to argue that differential geometry should be in every mathematician's arsenal.

Loring W. Tu was born in Taipei, Taiwan, and grew up in Taiwan, Canada, and the United States. He attended McGill and Princeton as an undergraduate, and obtained his Ph.D. from Harvard University under the supervision of Phillip A. Griffiths. He has taught at the University of Michigan, Ann Arbor, and at Johns Hopkins University, and is currently Professor of Mathematics at Tufts University. An algebraic geometer by training, he has done research at the interface of algebraic geometry, topology, and differential geometry, including Hodge theory, degeneracy loci, moduli spaces of vector bundles, and equivariant cohomology. He is the coauthor with Raoul Bott of *Differential Forms in Algebraic Topology* and the author of *An Introduction to Manifolds*.

I purchased this book through Springer, but was so pleased with it that I felt that I needed to write a review on . In my (rather limited, but perhaps that's the point) experience, books on Differential Geometry normally focus on an introduction to Riemannian geometry (do Carmo, Lafontaine, Lee, etc) or were relatively advanced and took the perspective of bundles (Kobayashi & Nomizu, Walschlap, Poor, etc.). There were a few texts that tried to "bridge the gap" so-to-speak, namely the five-volume opus of Spivak and the excellent text of Taubes, but there was a distinct need for a text that could take someone from knowing zero differential geometry, to someone that knows the equivalent of a few good courses in the subject. Thankfully, this text seems to have succeeded. The author has managed, in under 350 pages, to take one from inner products on vector spaces all the way to characteristic classes on principal G-bundles, in such a way that the historical motivation is clear and most geometric viewpoint is taken throughout. I wholeheartedly recommend this book to anyone seeking a good introduction to differential geometry.

Great book and excellent service!

[Download to continue reading...](#)

Differential Geometry: Connections, Curvature, and Characteristic Classes (Graduate Texts in Mathematics) Modern Geometry – Methods and Applications: Part I: The Geometry of Surfaces, Transformation Groups, and Fields (Graduate Texts in Mathematics) (Pt. 1) Differential Topology (Graduate Texts in Mathematics) First Steps in Differential Geometry: Riemannian, Contact, Symplectic (Undergraduate Texts in Mathematics) Riemannian Holonomy Groups and Calibrated Geometry (Oxford Graduate Texts in Mathematics) Topology and Geometry (Graduate Texts in Mathematics) Commutative Algebra: with a View Toward Algebraic Geometry (Graduate

Texts in Mathematics) Algebraic Geometry (Graduate Texts in Mathematics) Algebraic Geometry: A First Course (Graduate Texts in Mathematics) (v. 133) The Geometry of Schemes (Graduate Texts in Mathematics) Lectures on Discrete Geometry (Graduate Texts in Mathematics) The Geometry of Discrete Groups (Graduate Texts in Mathematics) Differential Equations and Their Applications: An Introduction to Applied Mathematics (Texts in Applied Mathematics) (v. 11) Spectral Geometry of the Laplacian: Spectral Analysis and Differential Geometry of the Laplacian Geometry: Integration, Applications, Connections Student Edition (MERRILL GEOMETRY) Geometric Properties of Natural Operators Defined by the Riemann Curvature Tensor Geometry, Particles, and Fields (Graduate Texts in Contemporary Physics) Fractal Geometry and Dynamical Systems in Pure and Applied Mathematics I: Fractals in Pure Mathematics (Contemporary Mathematics) Tensor and Vector Analysis: With Applications to Differential Geometry (Dover Books on Mathematics) Differential Equations and Dynamical Systems (Texts in Applied Mathematics)

[Contact Us](#)

[DMCA](#)

[Privacy](#)

[FAQ & Help](#)