Symplectic Geometry

This book presents a broad overview of the theory and applications of structure topology and symplectic geometry. Over six chapters, the authors cover topics such as linear operators, Omega and Clifford algebra, and quasiconformal reflection across polygonal lines. The book also includes four interesting case studies on time series analysis in practice. Finally, it provides a snapshot of some current trends and future challenges in the research of symplectic geometry theory. Structure Topology and Symplectic Geometry is a resource for scholars, researchers, and teachers in the field of mathematics, as well as researchers and students in engineering.

Book endorsed by the Sunyer Prize Committee (A. Weinstein, J. Oesterle et. al.).

Among all the Hamiltonian systems, the integrable ones have special geometric properties; in particular, their solutions are very regular and quasi-periodic. This book serves as an introduction to symplectic and contact geometry for graduate students, exploring the underlying geometry of integrable Hamiltonian systems. Includes exercises designed to complement the expositiont, and up-to-date references.

Analysis of an old variational principal in classical mechanics has established global periodic phenomena in Hamiltonian systems. One of the links is a class of sympletic invariants, called sympletic capacities, and these invariants are the main theme of this book. Topics covered include basic sympletic geometry, sympletic capacities and rigidity, sympletic fixed point theory, and a survey on Floer homology and sympletic homology.

The Topology of Torus Actions on Symplectic Manifolds

Riemannian Geometry of Contact and Symplectic Manifolds

Actes Du Colloque en L'honneur de Jean-Marie Souriau ; [Conference Held in Aix-en-Provence (France), June 11 - 15, 1990]

The Geometry of the Group of Symplectic Diffeomorphism

Symplectic Geometric Algorithms for Hamiltonian Systems

Published in two volumes, this is the first book to provide a thorough and systematic explanation of symplectic topology, and the analytical details and techniques used in applying the machinery arising from Floer theory as a whole. Volume 1 covers the basic materials of Hamiltonian dynamics and symplectic geometry and the analytic foundations of Gromov's pseudoholomorphic curve theory. One novel aspect of this treatment is the uniform treatment of both closed and open cases and a complete proof of the boundary regularity theorem of weak solutions of pseudo-holomorphic curves with totally real boundary conditions. Volume 2 provides a comprehensive introduction to both Hamiltonian Floer theory and Lagrangian Floer theory. Symplectic Topology and Floer Homology is a comprehensive resource suitable for experts and newcomers alike.

The goal of these notes is to provide a fast introduction to symplectic geometry for graduate students with some knowledge of differential geometry, de Rham theory and classical Lie groups. This text addresses symplectomorphisms, local forms, contact manifolds, compatible almost complex structures, Kaehler manifolds, hamiltonian mechanics, moment maps, symplectic reduction and symplectic toric manifolds. It contains guided problems, called homework, designed to complement the exposition or extend the reader's understanding. There are by now excellent references on symplectic geometry, a subset of which is in the bibliography of this book. However, the most efficient introduction to a subject is often a short elementary treatment, and these notes attempt to serve that purpose. This text provides a taste of areas of current research and will prepare the reader to explore recent papers and extensive books on symplectic geometry where the pace is much faster. For this reprint numerous corrections and clarifications have been made, and the layout has been improved.

Symplectic Geometry focuses on the processes, methodologies, and numerical approaches involved in symplectic geometry. The book first offers information on the symplectic and discontinuous groups, symplectic metric, and hermitian forms. Numerical calculations are presented to show the values and transformations of these groups. The text then examines the fundamental domain of the modular group and the volume of the fundamental domain of the modular group. Equations and matrices are provided to show the fundamental domain and volume of the fundamental domain of the modular group. The publication ponders on commensurable groups and unit groups of quinary quadratic forms. Numerical analyses are also offered to show the values and characteristics of commensurable and unit groups. The text is a helpful reference for researchers interested in symplectic geometry.

The material and references in this extended second edition of "The Topology of Torus Actions on Symplectic Manifolds", published as Volume 93 in this series in 1991, have been updated. Symplectic manifolds and torus actions are investigated, with numerous examples of torus actions, for instance on some moduli spaces. Although the book is still centered on convexity results, it contains much more material, in particular lots of new examples and exercises.

Symplectic Geometry and Quantization

Two Symposia on Symplectic Geometry and Quantization Problems, July 1993, Japan

Symplectic Geometry and Mirror Symmetry

Symplectic Geometry and its Applications

Embedding Problems in Symplectic Geometry

* The invited papers in this volume are written in honor of Alan Weinstein, one of the world’s foremost geometers * Contributions cover a broad range of topics in symplectic and differential geometry, Lie theory, mechanics, and related fields * Intended for graduate students and working mathematicians, this text is a distillation of prominent research and an indication of future trends in geometry, mechanics, and mathematical physics

This book arises from the INdAM Meeting "Complex and Symplectic Geometry", which was held in Cortona in June 2016. Several leading specialists, including young researchers, in the field of complex and symplectic geometry, present the state of the art of their research on topics such as the cohomology of complex manifolds; analytic techniques in Kähler and non-Kähler geometry; almost-complex and symplectic structures; special structures on complex manifolds; and deformations of complex objects. The work is intended for researchers in these areas.

Symplectic Geometry and Quantum MechanicsSpringer Science & Business Media

This book is devoted to pseudo-holomorphic curve methods in symplectic geometry. It contains an introduction to symplectic geometry and relevant techniques of Riemannian geometry, proofs of Gromov's compactness theorem, an investigation of local properties of holomorphic curves, including positivity of intersections, and applications to Lagrangian embeddings problems. The chapters are based on a series of lectures given previously by the authors M. Audin, A. Banyaga, P. Gauduchon, F. Labourie, J. Lafontaine, F. Lalonde, Gang Liu, D. McDuff, M.-P. Muller, P. Pansu, L. Polterovich, J.C. Sikorav. In an attempt to make this book accessible also to graduate students, the authors provide the necessary examples and techniques needed to understand the applications of the theory. The exposition is essentially self-contained and includes numerous exercises.

Northern California Symplectic Geometry Seminar

Symplectic Geometry and Mathematical Physics

Symplectic Geometry, Groupoids, and Integrable Systems

Symplectic Topology and Floer Homology: Volume 1, Symplectic Geometry and Pseudoholomorphic Curves

Second Edition

Approach your problems from the right end It isn't that they can't see the solution. and begin with the answers. Then one day, It is that they can't see the problem. perhaps you will find the final question. G. K. Chesterton. The Scandal of Father 'The Hermit Clad in Crane Feathers' Brown 'The point of a Pin'. in R. van Gulik's The Chinese Maze Murders. Growing specialization and diversification have brought a host of monographs and textbooks on increasingly specialized topics. However, the "tree" of knowledge of mathematics and related fields does not grow only by putting forth new branches. It also happens, quite often in fact, that branches which were thouglit to be completely disparate are suddenly seen to be related. Further, the kind and level of sophistication of mathematics applied in various sci ences has changed drastically in recent years: measure theory is used (non-trivially) in re gional and theoretical economics; algebraic geometry interacts with physics; the Minkowsky lemma, coding theory and the structure of water meet one another in packing and covering theory; quantum fields, crystal defects and mathematical programming profit from homo topy theory; Lie algebras are relevant to filtering; and prediction and electrical engineering can use Stein spaces.

The seminar Symplectic Geometry at the University of Berne in summer 1992 showed that the topic of this book is a very active field, where many different branches of mathematics come tog9ther: differential geometry, topology, partial differential equations, variational calculus, and complex analysis. As usual in such a situation, it may be tedious to collect all the necessary ingredients. The present book is intended to give the nonspecialist a solid introduction to the recent developments in symplectic and contact geometry. Chapter 1 gives a review of the symplectic group Sp(n,R), sympkctic manifolds, and Hamiltonian systems (last but not least to fix the notations). The 1\Iaslov index for closed curves as well as arcs in Sp(n, R) is discussed. This index will be used in chapters 5 and 8. Chapter 2 contains a more detailed account of symplectic manifolds start ing with a proof of the Darboux theorem saying that there are no local in variants in symplectic geometry. The most important examples of symplectic manifolds will be introduced: cotangent spaces and Kahler manifolds. Finally we discuss the theory of coadjoint orbits and the Kostant-Souriau theorem, which are concerned with the question of which homogeneous spaces carry a symplectic structure.

In 1993, M. Kontsevich proposed a conceptual framework for explaining the phenomenon of mirror symmetry. Mirror symmetry had been discovered by physicists in string theory as a duality between families of three-dimensional Calabi–Yau manifolds. Kontsevich's proposal uses Fukaya's construction of the A∞-category of Lagrangian submanifolds on the symplectic side and the derived category of coherent sheaves on the complex side. The theory of mirror symmetry was further enhanced by physicists in the language of D-branes and also by Strominger–Yau–Zaslow in the geometric set-up of (special) Lagrangian torus fibrations. It rapidly expanded its scope across from geometry, topology, algebra to physics. In this volume, leading experts in the field explore recent developments in relation to homological mirror symmetry, Floer theory, D-branes and Gromov–Witten invariants. Kontsevich-Soibelman describe their solution to the mirror conjecture on the abelian variety based on the deformation theory of A∞-categories, and Ohta describes recent work on the Lagrangian intersection Floer theory by Fukaya–Oh–Ohta–Ono which takes an important step towards a rigorous construction of the A∞-category. There follow a number of contributions on the homological mirror symmetry, D-branes and the Gromov–Witten invariants, e.g. Getzler shows how the Toda conjecture follows from recent work of Givental, Okounkov and Pandharipande. This volume provides a timely presentation of the important developments of recent years in this rapidly growing field.

This second edition continues to serve as the definitive source of information about some areas of differential topology (J-holomorphic curves) and applications to quantum cohomology. The main goal of the book is to establish the fundamental theorems of the subject in full and rigorous detail. It may also serve as an introduction to current work in symplectic topology. The second edition clarifies various arguments, includes some additional results, and updates the references to recent developments.

Symplectic Geometry of Integrable Hamiltonian Systems

Symplectic Geometry and Secondary Characteristic Classes

Complex and Symplectic Geometry

Topological Persistence in Geometry and Analysis

Structure Topology and Symplectic Geometry

The group of Hamiltonian diffeomorphisms Ham(M, 0) of a symplectic mani fold (M, 0) plays a fundamental role both in geometry and classical mechanics. For a geometer, at least under some assumptions on the manifold M, this is just the connected component of the identity in the group of all symplectic diffeomorphisms. From the viewpoint of mechanics, Ham(M,O) is the group of all admissible motions. What is the minimal amount of energy required in order to generate a given Hamiltonian diffeomorphism I? An attempt to formalize and answer this natural question has led H. Hofer [HI] (1990) to a remarkable discovery. It turns out that the solution of this variational problem can be interpreted as a geometric quantity, namely as the distance between I and the identity transformation. Moreover this distance is associated to a canonical biinvariant metric on Ham(M, 0). Since Hofer's work this new ge ometry has been intensively studied in the framework of modern symplectic topology. In the present book I will describe some of these developments. Hofer's geometry enables us to study various notions and problems which come from the familiar finite dimensional geometry in the context of the group of Hamiltonian diffeomorphisms. They turn out to be very different from the usual circle of problems considered in symplectic topology and thus extend significantly our vision of the symplectic world.

Symplectic geometry has its origins as a geometric language for classical mechanics. But it has recently exploded into an independent field interconnected with many other areas of mathematics and physics. The goal of the IAS/Park City Mathematics Institute Graduate Summer School on Symplectic Geometry and Topology was to give an intensive introduction to these exciting areas of current research. Included in this proceedings are lecture notes from the following courses: Introductionto Symplectic Topology by D. McDuff; Holomorphic Curves and Dynamics in Dimension Three by H. Hofer; An Introduction to the Seiberg-Witten Equations on

Symplectic Manifolds by C. Taubes; Lectures on Floer Homology by D. Salamon; A Tutorial on Quantum Cohomology by A. Givental; Euler Characteristicsand Lagrangian Intersections by R. MacPherson; Hamiltonian Group Actions and Symplectic Reduction by L. Jeffrey; and Mechanics: Symmetry and Dynamics by J. Marsden. Information for our distributors: Titles in this series are copublished with the Institute for Advanced Study/Park City Mathematics Institute. Members of the Mathematical Association of America (MAA) and the National Council of Teachers of Mathematics (NCTM) receive a 20% discount from list price.

The papers, some of which are in English, the rest in French, in this volume are based on lectures given during the meeting of the Seminare Sud Rhodanien de Geometrie (SSRG) organized at the Mathematical Sciences Research Institute in 1989. The SSRG was established in 1982 by geometers and mathematical physicists with the aim of developing and coordinating research in symplectic geometry and its applications to analysis and mathematical physics. Among the subjects discussed at the meeting, a special role was given to the theory of symplectic groupoids, the subject of fruitful collaboration involving geometers from Berkeley, Lyon, and Montpellier.

From the reviews of the first edition:"... Here ... a wealth of material is displayed for us, too much to even indicate in a review. ... Your reviewer was very impressed by the contents of both volumes (EMS 2 and 4), recommending them without any restriction." Mededelingen van het Wiskundig genootshap 1992

The Breadth of Symplectic and Poisson Geometry

Introduction to Symplectic Geometry

Dynamical Systems IV

Symplectic Geometry and Fourier Analysis

Gauge Theory and Symplectic Geometry

This introductory book offers a unique and unified overview of symplectic geometry, highlighting the differential properties of symplectic manifolds. It consists of six chapters: Some Algebra Basics, Symplectic Manifolds, Cotangent Bundles, Symplectic G-spaces, Poisson Manifolds, and A Graded Case, concluding with a discussion of the differential properties of graded symplectic manifolds of dimensions (0,n). It is a useful reference resource for students and researchers interested in geometry, group theory, analysis and differential equations.This book is also inspiring in the emerging field of Geometric Science of Information, in particular the chapter on Symplectic G-spaces, where Jean-Louis Koszul develops Jean-Marie Souriau's tools related to the non-equivariant case of co-adjoint action on Souriau’s moment map through Souriau’s Cocycle, opening the door to Lie Group Machine Learning with Souriau-Fisher metric.

"Symplectic Geometric Algorithms for Hamiltonian Systems" will be useful not only for numerical analysts, but also for those in theoretical physics, computational chemistry, celestial mechanics, etc. The book generalizes and develops the generating function and Hamilton-Jacobi equation theory from the perspective of the symplectic geometry and symplectic algebra. It will be a useful resource for engineers and scientists in the fields of quantum theory, astrophysics, atomic and molecular dynamics, climate prediction, oil exploration, etc. Therefore a systematic research and development of numerical methodology for Hamiltonian systems is well motivated. Were it successful, it would imply wide-ranging applications.

Over the last number of years powerful new methods in analysis and topology have led to the development of the modern global theory of symplectic topology, including several striking and important results. The first edition of Introduction to Symplectic Topology was published in 1995. The book was the first comprehensive introduction to the subject and became a key text in the area. A significantly revised second edition was published in 1998 introducing new sections and updates on the fast-developing area. This new third edition includes updates and new material to bring the book right up-to-date.

Symplectic geometry is a central topic of current research in mathematics. Indeed, symplectic methods are key ingredients in the study of dynamical systems, differential equations, algebraic geometry, topology, mathematical physics and representations of Lie groups. This book is a true introduction to symplectic geometry, assuming only a general background in analysis and familiarity with linear algebra. It starts with the basics of the geometry of symplectic vector spaces. Then, symplectic manifolds are defined and explored. In addition to the essential classic results, such as Darboux's theorem, more recent results and ideas are also included here, such as symplectic capacity and pseudoholomorphic curves. These ideas have revolutionized the subject. The main examples of symplectic manifolds are given, including the cotangent bundle, Kahler manifolds, and coadjoint orbits. Further principal ideas are carefully examined, such as Hamiltonian vector fields, the Poisson bracket, and connections with contact manifolds. Berndt describes some of the close connections between symplectic geometry and mathematical physics in the last two chapters of the book. In particular, the moment map is defined and explored, both mathematically and in its relation to physics. He also introduces symplectic reduction, which is an important tool for reducing the number of variables in a physical system and for constructing new symplectic manifolds from old. The final chapter is on quantization, which uses symplectic methods to take classical mechanics to quantum mechanics. This section includes a discussion of the Heisenberg group and the Weil (or metaplectic) representation of the symplectic group. Several appendices provide background material on vector bundles, on cohomology, and on Lie groups and Lie algebras and their representations. Berndt's presentation of symplectic geometry is a clear and concise introduction to the major methods and applications of the subject, and requires only a minimum of prerequisites. This book would be an excellent text for a graduate course or as a source for anyone who wishes to learn about symplectic geometry.

Séminaire Sud Rhodanien de Géométrie à Berkeley (1989)

Symplectic Invariants and Hamiltonian Dynamics

Holomorphic Curves in Symplectic Geometry

Symplectic Geometry

An Introduction based on the Seminar in Bern, 1992

This is a book on symplectic topology, a rapidly developing field of mathematics which originated as a geometric tool for problems of classical mechanics. Since the 1980s, powerful methods such as Gromov's pseudo-holomorphic curves and Morse-Floer theory on loop spaces gave rise to the discovery of unexpected symplectic phenomena. The present book focuses on function spaces associated with a symplectic manifold. A number of recent advances show that these spaces exhibit intriguing properties and structures, giving rise to an alternative intuition and new tools in symplectic topology. The book provides an essentially self-contained introduction into these developments along with applications to symplectic topology, algebra and geometry of symplectomorphism groups, Hamiltonian dynamics and quantum mechanics. It will appeal to researchers and students from the

graduate level onwards. I like the spirit of this book. It formulates concepts clearly and explains the relationship between them. The subject matter is important and interesting. --Dusa McDuff, Barnard College, Columbia University This is a very important book, coming at the right moment. The book is a remarkable mix of introductory chapters and research topics at the very forefront of actual research. It is full of cross fertilizations of different theories, and will be useful to Ph.D. students and researchers in symplectic geometry as well as to many researchers in other fields (geometric group theory, functional analysis, mathematical quantum mechanics). It is also perfectly suited for a Ph.D.-students seminar. --Felix Schlenk, Universite de Neuchatel Suitable for graduate students in mathematics, this monograph covers differential and symplectic geometry, homogeneous symplectic manifolds, Fourier analysis, metaplectic representation, quantization, Kirillov theory. Includes Appendix on Quantum Mechanics by Robert Hermann. 1977 edition.

This volume contains the proceedings of the conference "Colloque de Goometrie Symplectique et Physique Mathematique" which was held in Aix-en-Provence (France), June 11-15, 1990, in honor of Jean-Marie Souriau. The conference was one in the series of international meetings of the Seminaire Sud Rhodanien de Goometrie, an organization of geometers and mathematical physicists at the Universities of Avignon, Lyon, Mar seille, and Montpellier. The scientific interests of Souriau, one of the founders of geometric quantization, range from classical mechanics (symplectic geometry) and quantization problems to general relativity and astrophysics. The themes of this conference cover "only" the first two of these four areas. The subjects treated in this volume could be classified in the follow ing way: symplectic and Poisson geometry (Arms-Wilbour, Bloch-Ratiu, Brylinski-Kostant, Cushman-Sjamaar, Dufour, Lichnerowicz, Medina, Ouzilou), classical mechanics (Benenti, Holm-Marsden, Marle) , particles and fields in physics (Garcia Perez-Munoz Masque, Gotay, Montgomery, Ne'eman-Sternberg, Sniatycki) and quantization (Blattner, Huebschmann, Karasev, Rawnsley, Roger, Rosso, Weinstein). However, these subjects are so interrelated that a classification by headings such as "pure differential geometry, applications of Lie groups, constrained systems in physics, etc. ," would have produced a completely different clustering! The list of authors is not quite identical to the list of speakers at the conference. M. Karasev was invited but unable to attend; C. Itzykson and M. Vergne spoke on work which is represented here only by the title of Itzykson's talk (Surfaces triangulees et integration matricielle) and a summary of Vergne's talk.

The theory of persistence modules originated in topological data analysis and became an active area of research in algebraic topology. This book provides a concise and self-contained introduction to persistence modules and focuses on their interactions with pure mathematics, bringing the reader to the cutting edge of current research. In particular, the authors present applications of persistence to symplectic topology, including the geometry of symplectomorphism groups and embedding problems. Furthermore, they discuss topological function theory, which provides new insight into oscillation of functions. The book is accessible to readers with a basic background in algebraic and differential topology.

Proceedings of the 4th KIAS Annual International Conference, Korea Institute for Advanced Study, Seoul, South Korea, 14-18 August 2000

Symplectic Geometry and Quantum Mechanics

First Steps in Differential Geometry

An Introduction to Symplectic Geometry

Introduction to Symplectic Topology

Gauge theory, symplectic geometry and symplectic topology are important areas at the crossroads of several mathematical disciplines. The present book, with expertly written surveys of recent developments in these areas, includes some of the first expository material of Seiberg-Witten theory, which has revolutionised the subjects since its introduction in late 1994. Topics covered include: introductions to Seiberg-Witten theory, to applications of the S-W theory to four-dimensional manifold topology, and to the classification of symplectic manifolds; an introduction to the theory of pseudo-holomorphic curves and to quantum cohomology; algebraically integrable Hamiltonian systems and moduli spaces; the stable topology of gauge theory, Morse-Floer theory; pseudo-convexity and its relations to symplectic geometry; generating functions; Frobenius manifolds and topological quantum field theory.

This seminar was established to encourage ongoing interaction between geometers at Stanford University and the University of California (Berkeley, Davis, and Santa Cruz). Over the years, lectures presented have provided a panorama of developments in symplectic and contact geometry and topology, Poisson geometry, quantization theory, and applications. This volume includes papers by several of the distinguished seminar participants. The diversity of the topics from the seminar are reflected in the informative presentations. A wide range of topics are presented in the book, including symplectic topology, Hamiltonian dynamics, quantum cohomology and mirror symmetry, infinite-dimensional symplectic geometry, the theory of Hamiltonian group actions, and

quantization.
This volume is based on lectures given at a workshop and conference on symplectic geometry at the University of Warwick in August 1990.
This volume presents some of the lectures and research during the special programme held at the Newton Institute in 1994. The two parts each contain a mix of substantial expository articles and research papers that outline important and topical ideas. Many of the results have not been presented before, and the lectures on Floer homology is the first avaliable in book form.Symplectic methods are one of the most active areas of research in mathematics currently, and this volume will attract much attention.
Symplectic Geometry and Topology
Symplectic Techniques in Physics
J-holomorphic Curves and Symplectic Topology
Festschrift in Honor of Alan Weinstein
Symplectic Geometry and Analytical Mechanics
Symplectic geometry is very useful for clearly and concisely formulating problems in classical physics and also for understanding the link between classical problems and their quantum counterparts. It is thus a subject of interest to both mathematicians and physicists, though they have approached the subject from different view points. This is the first book that attempts to reconcile these approaches. The authors use the uncluttered, coordinate-free approach to symplectic geometry and classical mechanics that has been developed by mathematicians over the course of the last thirty years, but at the same time apply the apparatus to a great number of concrete problems. In the first chapter, the authors provide an elementary introduction to symplectic geometry and explain the key concepts and results in a way accessible to physicists and mathematicians. The remainder of the book is devoted to the detailed analysis and study of the ideas discussed in Chapter 1. Some of the themes emphasized in the book include the pivotal role of completely integrable systems, the importance of symmetries, analogies between classical dynamics and optics, the importance of symplectic tools in classical variational theory, symplectic features of classical field theories, and the principle of general covariance. This work can be used as a textbook for graduate courses, but the depth of coverage and the wealth of information and application means that it will be of continuing interest to, and of lasting significance for mathematicians and mathematically minded physicists.
The present work grew out of a study of the Maslov class (e. g. (37]), which is a fundamental invariant in asymptotic analysis of partial differential equations of quantum physics. One of the many in terpretations of this class was given by F. Kamber and Ph. Tondeur (43], and it indicates that the Maslov class is a secondary characteristic class of a complex trivial vector bundle endowed with a real reduction of its structure group. (In the basic paper of V. I. Arnold about the Maslov class (2], it is also pointed out without details that the Maslov class is characteristic in the category of vector bundles mentioned pre viously.) Accordingly, we wanted to study the whole range of secondary characteristic classes involved in this interpretation, and we gave a short description of the results in (83]. It turned out that a complete exposition of this theory was rather lengthy, and, moreover, I felt that many potential readers would have to use a lot of scattered references in order to find the necessary information from either symplectic geometry or the theory of the secondary characteristic classes. On the otherhand, both these subjects are of a much larger interest in differential geome try and topology, and in the applications to physical theories.
Differential geometry arguably offers the smoothest transition from the standard university mathematics sequence of the first four semesters in calculus, linear algebra, and differential equations to the higher levels of abstraction and proof encountered at the upper division by mathematics majors. Today it is possible to describe differential geometry as "the study of structures on the tangent space," and this text develops this point of view. This book, unlike other introductory texts in differential geometry, develops the architecture necessary to introduce symplectic and contact geometry alongside its Riemannian cousin. The main goal of this book is to bring the undergraduate student who already has a solid foundation in the standard mathematics curriculum into contact with the beauty of higher mathematics. In particular, the presentation here emphasizes the consequences of a definition and the careful use of examples and constructions in order to explore those consequences.
Symplectic geometry has its origins as a geometric language for classical mechanics but has recently exploded into an independent field interconnected with many other areas of mathematics and physics. The goal of the IAS/Park City Mathematics Institute Graduate Summer School on Symplectic Geometry and Topology was to give an intensive introduction to these areas of current research.
Function Theory on Symplectic Manifolds
Riemannian, Contact, Symplectic
Contact and Symplectic Geometry
Lectures on Symplectic Geometry
This volume contains the refereed proceedings of two symposia on symplectic geometry and quantization problems which were held in Japan in July 1993. The purpose of the symposia was to discuss recent progress in a range of related topics in symplectic geometry and mathematical physics, including symplectic groupoids, geometric quantization, noncommutative differential geometry, equivariant cohomology, deformation quantization, topological quantum field theory, and knot invariants. The book provides insight into how these different topics relate to one another and offers intriguing new problems. Providing a look at the frontier of research in symplectic geometry and quantization, this book is suitable as a source book for a seminar in symplectic geometry.
Symplectic geometry is the geometry underlying Hamiltonian dynamics, and symplectic mappings arise as

time-1-maps of Hamiltonian flows. The spectacular rigidity phenomena for symplectic mappings discovered in the last two decades show that certain things cannot be done by a symplectic mapping. For instance, Gromov's famous "non-squeezing'' theorem states that one cannot map a ball into a thinner cylinder by a symplectic embedding. The aim of this book is to show that certain other things can be done by symplectic mappings. This is achieved by various elementary and explicit symplectic embedding constructions, such as "folding", "wrapping'', and "lifting''. These constructions are carried out in detail and are used to solve some specific symplectic embedding problems. The exposition is self-contained and addressed to students and researchers interested in geometry or dynamics.
This book offers a complete discussion of techniques and topics intervening in the mathematical treatment of quantum and semi-classical mechanics. It starts with a very readable introduction to symplectic geometry. Many topics are also of genuine interest for pure mathematicians working in geometry and topology.