An Introduction To Symplectic Geometry

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An Introduction to Compactness Results in Symplectic Field Theory
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Lectures on the Geometry of Poisson Manifolds
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An Introduction to Contact Topology

Lectures on the Geometry of Quantization
An Introduction to Riemannian Geometry

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Symplectic Geometry and Topology Springer Science & Business Media
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.
J-holomorphic Curves and Symplectic Topology Springer Science & Business Media
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. This new third edition of a classic book in the feild includes updates and new material to bring the material right up-to-date.
First Steps in Differential Geometry Springer
This book constructs the mathematical apparatus of classical mechanics from the beginning, examining basic problems in dynamics like the theory of oscillations and the Hamiltonian formalism. The author emphasizes geometrical considerations and includes phase spaces and flows, vector fields, and Lie groups. Discussion includes qualitative methods of the theory of dynamical systems and of asymptotic methods like averaging and adiabatic invariance.
Applied Differential Geometry Springer Science & Business Media
The method of using the moduli space of pseudo-holomorphic curves on a symplectic manifold was introduced by Mikhail Gromov in 1985. From the appearance of Gromov's original paper until today this approach has been the most important tool in global symplectic geometry. To produce numerical invariants of these manifolds using this method requires constructing a fundamental cycle associated with moduli spaces. This volume brings together three approaches to constructing the “virtual” fundamental cycle for the moduli space of pseudo-holomorphic curves. All approaches are based on the idea of local Kuranishi charts for the moduli space. Workers in the field will get a comprehensive understanding of the details of these constructions and the assumptions under which they can be made. These techniques and results will be essential in further applications of this approach to producing invariants of symplectic manifolds.
Symplectic Invariants and Hamiltonian Dynamics Springer Science & Business Media
This first edition of this book quickly became an established text in this fast-developing branch of mathematics. This second edition has been significantly revised and expanded. It includes a section on new developments and an expanded discussion of Taubes' and Donaldson's recent results.
Differential Geometry and Mathematical Physics Springer Nature
. E C, 0 1'1 1, and n E Z, n ~ 2. Let~.. be the O-dimensional Lie n group generated by the transformation z ~ >.z, z E C - {a}. Then (cf.
From Stein to Weinstein and Back Cambridge University Press
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.
Mathematical Methods of Classical Mechanics American Mathematical Soc.
The book introduces the basic notions in Symplectic and Contact Geometry at the level of the second year graduate student. It also contains many exercises, some of which are solved only in the last chapter.We begin with the linear theory, then give the definition of symplectic manifolds and some basic examples, review advanced calculus, discuss Hamiltonian systems, tour rapidly group and the basics of contact geometry, and solve problems in chapter 8. The material just described can be used as a one semester course on Symplectic and Contact Geometry.The book contains also more advanced material, suitable to advanced graduate students and researchers.
Holomorphic Curves in Symplectic Geometry American Mathematical Soc.
Symplectic and contact geometry naturally emerged from the mathematical description of classical physics. The discovery of new rigidity phenomena and properties satisfied by these geometric structures launched a new research field worldwide. The intense activity of many European research groups in this field is reflected by the ESF Research Networking Programme "Contact And Symplectic Topology" (CAST). The lectures of the Summer School in Nantes (June 2011) and of the CAST Summer School in Budapest (July 2012) provide a nice panorama of many aspects of the present status of contact and symplectic topology. The notes of the minicourses offer a gentle introduction to topics which have developed in an amazing speed in the recent past. These topics include 3-dimensional and higher dimensional contact topology, Fukaya categories, asymptotically holomorphic methods in contact topology, bordered Floer homology, embedded contact homology, and flexibility results for Stein manifolds.
Introduction to Symplectic Topology World Scientific
This book gives an introduction to index theory for symplectic matrix paths and its iteration theory, as well as applications to periodic solution problems of nonlinear Hamiltonian systems. The applications of these concepts yield new approaches to some outstanding problems. Particular attention is given to the minimal period solution problem of Hamiltonian systems and the existence of infinitely many periodic points of the Poincaré map of Lagrangian systems on tori.
An Introduction to Symplectic Geometry American Mathematical Soc.
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.

Symplectic Techniques in Physics American Mathematical Soc.

This volume is the first one that gives a systematic and self-contained introduction to the theory of symplectic Dirac operators and reflects the current state of the subject. At the same time, it is intended to establish the idea that symplectic spin geometry and symplectic Dirac operators may give valuable tools in symplectic geometry and symplectic topology, which have become important fields and very active areas of mathematical research.

An Introduction to Manifolds American Mathematical Soc.

This book is addressed to graduate students and researchers in the fields of mathematics and physics who are interested in mathematical and theoretical physics, differential geometry, mechanics, quantization theories and quantum physics, quantum groups etc., and who are familiar with differentiable and symplectic manifolds. The aim of the book is to provide the reader with a monograph that enables him to study systematically basic and advanced material on the recently developed theory of Poisson manifolds, and that also offers ready access to bibliographical references for the continuation of his study. Until now, most of this material was dispersed in research papers published in many journals and languages. The main subjects treated are the Schouten-Nijenhuis bracket; the generalized Frobenius theorem; the basics of Poisson manifolds; Poisson calculus and cohomology; quantization; Poisson morphisms and reduction; realizations of Poisson manifolds by symplectic manifolds and by symplectic groupoids and Poisson-Lie groups. The book unifies terminology and notation. It also reports on some original developments stemming from the author's work, including new results on Poisson cohomology and geometric quantization, cofoliations and biinvariant Poisson structures on Lie groups.

Symplectic Geometry and Quantum Mechanics Springer

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.

Riemannian Geometry of Contact and Symplectic Manifolds Birkhäuser

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.

Introduction to Differential Geometry Springer Science & Business Media

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

Contact and Symplectic Topology Princeton University Press

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\laslov 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.

Contact and Symplectic Geometry Springer Science & Business Media

These notes are based on a course entitled ``Symplectic Geometry and Geometric Quantization'' taught by Alan Weinstein at the University of California, Berkeley (fall 1992) and at the Centre Emile Borel (spring 1994). The only prerequisite for the course needed is a knowledge of the basic notions from the theory of differentiable manifolds (differential forms, vector fields, transversality, etc.). The aim is to give students an introduction to the ideas of microlocal analysis and the related symplectic geometry, with an emphasis on the role these ideas play in formalizing the transition between the mathematics of classical dynamics (hamiltonian flows on symplectic manifolds) and quantum mechanics (unitary flows on Hilbert spaces). These notes are meant to function as a guide to the literature. The authors refer to other sources for many details that are omitted and can be bypassed on a first reading.

Introduction to Symplectic Geometry Birkhäuser

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.

Lectures on Symplectic Geometry Courier Dover Publications
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.