

Lecture Course

Introduction to symplectic geometry

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According to Klein's view as expressed in his famous Erlangen program, geometry is the study of certain "structures" on spaces, together with their transformation groups. The central piece of structure in symplectic geometry is a closed, nondegenerate differential two-form. The resulting theory is drastically different from Riemannian geometry, which is the study of a nondegenerate *symmetric* bilinear form. Historically, symplectic geometry grew out of Hamiltonian mechanics, which is still a source of many stimulating questions today. Via mirror symmetry, suggested by much more modern considerations in theoretical physics, it is also related to certain aspects of complex geometry.

About 25 years ago, Gromov completely changed the field with the introduction of holomorphic curves as a tool, and his landmark work has initiated an enormous development of new techniques and results.

The goal of the course is to give a thorough introduction to symplectic geometry and topology, starting from the basics and leading up to some of the modern themes.

Prerequisites: I will assume familiarity with the content of the bachelor level topology and differential geometry courses.

The course is intended for beginning Master students with an interest in geometry and topology, and will lay the foundations for further studies leading to possible Master thesis projects. However, interested Bachelor students are also encouraged to attend.

There will be 4 hours of lectures and 2 hours of exercise classes per week.