

Target group:

PhD students and postdocs in Mathematics

Course Title:**Introduction to the theory of J-holomorphic curves, Part II**

Extent: 2 hours per week, 14 weeks, 5 ECT credit

Aims: The primary aim of this seminar is for students to learn about the moduli space of J-holomorphic curves. We will closely follow Chapters 4 and 5 of the text "Lectures on Holomorphic Curves in Symplectic and Contact Geometry" by Chris Wendl. The subject of J-holomorphic curves is an essential ingredient in modern symplectic topology, so this seminar serves as preparation for students who wish to enter the field. Future seminars on topics in symplectic topology will rely upon the results of this course. Another aim is for students to practice giving a math lecture. Students will learn how to manage time constraints during a talk and how to field questions from the audience.

Synopsis: We begin by defining the moduli space of pointed Riemann surfaces. We exhibit this space as a quotient of Teichmüller space, which we show to be smooth of dimension given by the Riemann-Roch formula. Next, we prove that the moduli space of stable, Fredholm regular J-holomorphic curves is a smooth manifold and compute its dimension. To relax the Fredholm regularity hypothesis, we consider generic almost complex structures and prove transversality for generic J. Finally, we establish a special case of Gromov compactness in order to prove the non-squeezing theorem.

Evaluation method:

The evaluation will be based on an one hour presentation by each student in class (using the hours allocated for the course) on a topic related to the course. The lecturer and an internal censor will be present during the talk to evaluate the presentation and ask the student questions.

Teaching method:

In person lectures, where the students are encouraged to give at least one talk presenting material from the literature.

Responsible lecturer:

Ikshu Neithalath

Literature: Wendl, Chris - *Lectures on Holomorphic Curves in Symplectic and Contact Geometry*
McDuff, Dusa and Salamon, Dietmar - *J-holomorphic Curves and Symplectic Topology*

SCHEDULE SPRING 2022:

Time: Wednesdays 10-12

Location: IMADA Conference room (Ø18-509-2)