

GEOMETRY 3: SYMPLECTIC GEOMETRY

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This course is an introduction to various aspects of Symplectic Geometry (local forms, lagrangian submanifolds, Kähler manifolds, Hamiltonian mechanics, moment maps). The textbook is [1]. The course covers Chapters 1-3, 6-9 (parts 9.3,9.4 optional), 12-18, 21-24, 26. The assignment is Homeworks 1-3,5,6,8-13,16-20 from the textbook.

The course does not feature lectures. Instead, the participants are supposed to read the textbook and do the homework. There will be weekly discussion sessions, Tuesday, 3-6pm, 509 Lake. Students interested to take the class are encouraged to contact the instructor prior to registering via e-mail: i.losev at neu.edu

The final grade is determined from Homework: $A \geq 90\%$, $A- \geq 87\%$, $B+ \geq 85\%$, $B \geq 75\%$, $B- \geq 72\%$, $C+ \geq 70\%$, $C \geq 60\%$.

Program.

- 1) Symplectic forms.
- 2) Symplectic forms on cotangent bundles.
- 3) Lagrangian submanifolds.
- 4) Preparation to the local theory.
- 5) Moser theorem.
- 6) Darboux-Moser-Weinstein theorem.
- 7) Weinstein tubular neighborhood theorem.
- 8) Almost complex structures.
- 9) Compatible triples.
- 10) Dolbeault theory.
- 11) Complex manifolds.
- 12) Kähler forms.
- 13) Compact Kähler manifolds.
- 14) Hamiltonian vector fields.
- 15) Group actions on manifolds.
- 16) Hamiltonian actions.
- 17) Marsden-Meyer-Weinstein theorem.
- 18) Hamiltonian reduction.
- 19) Existence and uniqueness of moment maps.

REFERENCES

- [1] A. Cannas da Silva. *Lectures on Symplectic Geometry*. Lecture Notes in Mathematics, 1764. Springer, 2001.