MATH 7620 – Symplectic Geometry
Spring 2014

(Evolving) list of possible topics for student presentations

If you find a topic too deep or too wide for one person and one lecture, you can pair up with another student and prepare two lectures on the subject.

- **(My Huynh)** Gromov's non-squeezing theorem / Symplectic camel principle + Symplectic capacities. [MS, M1]
- Relation to classical mechanics and dynamical systems, for example 3-body problem or pendulum. [Ca] (looking for additional sources)
- **(Ahmad Rafiqi)** Intro to Poisson geometry, including showing that Poisson manifolds are foliated by symplectic leaves. [DZ, W]
- **(Zhexiu Tu)** Intro to Floer homology (analysis free): a bit of contact geometry, Legendrian knots, Chekanov homology (a combinatorial-only version of Floer homology). [Et, Ch1, Ch2]
- Intro to Floer homology: hamiltonian Floer homology. [S]
- Displacing Lagrangian toric fibers via probes. [M3]
- **(Hung Tran)** Circle actions on 4-dimensional manifolds. [K1, K2]
- Delzant theorem for toric symplectic orbifolds. [LT]
- Using Morse theory to read the cohomology of a toric symplectic manifold from its moment polytope. [Ew, F]
- **(Drew Zemke)** 3-dimensional contact geometry: existence and classification of contact structures in 3-manifolds.
- ... feel free to suggest other topics.

References

[Ca] Cannas da Silva, *Lectures on Symplectic Geometry* (book)

[Ch1] Chekanov, *Differential algebra of Legendrian links* (article)

[Ch2] Chekanov, *New invariants of Legendrian knots* (article)

[DZ] Dufour and Zung, *Normal forms of Poisson structures* (article)

[Et] Etnyre, *Legendrian and transversal knots* (survey article)

[Ew] Ewald, *Combinatorial convexity and algebraic geometry* (book)

[F] Fulton, *Introduction to toric varieties* (book)

[MS] McDuff and Salamon, *Introduction to Symplectic Topology* (book)

[M1] McDuff, *Symplectic Topology Today* (notes from Colloquium Lectures at the JMM 2014) `http://jointmathematicsmeetings.org/meetings/national/jmm2014/colloqnov2.pdf`

[M2] McDuff, *What is symplectic geometry* ("a gentle introduction" `http://www.barnard.edu/sites/default/files/ewmcambrevjn23.pdf`)

[M3] McDuff, *Displacing Lagrangian toric fibers via probes* (article)

[K1] Karshon, *Periodic Hamiltonian flows on four-dimensional manifolds* (article)

[K2] Karshon, *Periodic Hamiltonian flows on four-dimensional manifolds* (lecture notes)

[LT] Lerman and Tolman, *Symplectic toric orbifolds* (article)

[S] Salamon, *Lectures on Floer homology* (lecture notes for a summer school) `http://www.math.ethz.ch/~salamon/PREPRINTS/floer.pdf`

[W] Weinstein, *The local structure of Poisson manifolds* (article, see also errata)