Lie Groups and Lie Algebras in Symplectic Geometry
Math 995 - Fall 2008

Professor: Ricardo Castano-Bernard (rcastano@math.ksu.edu)

Prerequisites: A solid knowledge of groups and differentiable manifolds is expected. Math 876 Differential Topology is not mandatory but recommended.

Textbook: A list of recommended books will be provided as the course evolves.

Description: This is an introductory course to the geometry of group actions on manifolds. Emphasis will be put on Lie group actions on symplectic manifolds. The aim of this course is to apply algebraic techniques to understand the geometry underlying Hamiltonian differential equations and learn the basics of symplectic geometry along the way. Applications to physics will be given throughout the course.

Some of the topics of the course include:

1. Hamilton equations; symplectic manifolds;
2. Lie groups and Lie algebras, actions of Lie groups on manifolds;
3. Symplectic actions, Hamiltonian actions;
4. Lie algebra cohomology, cohomology of symplectic actions,
5. moment maps, symplectic reduction;
6. coadjoint actions, homogeneous spaces;
7. integrable Hamiltonian systems.

For more information about the course, please contact Ricardo Castano-Bernard