

## **Math 522: Lie Groups and Lie Algebras**

Spring 2015

Lectures: MWF 12:00-12:50 pm, 343 Altgeld Hall

Instructor: Florin P. Boca (fboca@math.uiuc.edu)

Office Hours (362 Altgeld Hall): Mon 4-5 pm, Th 3-4 pm, or by appointment

This course will provide an introduction to the study of Lie groups, Lie algebras, and their representations. The main topics will include:

- Finite group representations. Review of multilinear algebra.
- Linear Lie groups - definition and examples. Lie groups as manifolds.
- Lie algebras, as the tangent space at the identity to the Lie group, and as abstract objects.
- Representations of Lie groups and of Lie algebras.
- The classical groups.
- Integration on groups. Peter-Weyl theorems. Weyl's character formula.
- Roots, weights, reflections. Weyl groups.

**Prerequisites:** Undergraduate linear algebra, abstract algebra, point set topology, differentiation on manifolds.

**Textbook:** The textbook "Lie Groups - An Introduction Through Linear Groups" by Wulf Rossmann (Oxford Graduate Texts in Mathematics, Vol. 5, Oxford University Press, 2002) is recommended and will be used as main reference.

**Grading:** The final grade will be based on a final term presentation, four homework assignments, and class participation.