

G364. Topics in Representation Theory, Spring 2009.

In this course I will cover the basics of compact Lie Groups and their Representations.

The basic text will be Frank Adams book "Lectures on Lie Groups" (University of Chicago Press, 1983). It is a little dated but very concise. It is available on amazon.com for under \$ 20. We will try to work with examples as much as possible, mostly with classical groups.

Preliminaries:

Multivariable Calculus, Implicit Function Theorem, Differential forms, some facts about coverings.

The topics covered will include:

1. Basic definitions and examples.
2. Lie Groups and their Lie Algebras,
3. Exponential map, one parameter subgroups,
4. Classification Theorem,
5. Representations of compact Lie groups,
6. Peter-Weyl Theorem,
7. Description of irreducible representations for $U(n)$, $SO(n)$ and $Sp(n)$.

Other texts:

1. F. Adams, "Lectures on Exceptional Groups" (a sequel),
2. A.S. Pontryagin, "Continuous Groups" (a classic),
3. S. Helgason, "Differential Geometry, Lie groups and symmetric spaces", AMS, 2001 (another classic),
4. C. Procesi, Lie groups: an approach through invariants and representations, Springer, 2006 (a new and a very good book).

Grading will be based on homework.