Fall 2012, Course 18.745, Introduction to Lie algebras

MW 9:30–11, Room 2-136

Instructor: Roman Bezrukavnikov, office 2-284.
e-mail: bezrukav math.mit.edu

The course introduces the basics of Lie algebra theory, including the famous classification of simple Lie algebras by Dynkin diagrams and results leading to it – by the end of the course you should come to appreciate the beauty and importance of the list:

A_n, B_n, C_n, D_n, E_6, E_7, E_8, F_4 and G_2.

Time permitting, we will move into representation theory of semi-simple Lie algebras.

This is an intro level graduate course, motivated undergraduates are also welcome. **Prerequisites** include theoretical version of linear algebra and some experience with abstract algebra (18.701 + one of 18.702, 703, 712).

Textbook. There is no textbook for the course, though the material appears in several books: J. Humphreys "Introduction to Lie algebras and representation theory", N. Jacobson "Lie algebras", N. Bourbaki "Lie groups and Lie algebras", J.-P. Serre "Lie groups and Lie algebras", Encyclopaedia of Mathematical Sciences vol 41, (edited by Vinberg and Onischik) "Lie groups and Lie algebras III". Of these Humphreys' book is a textbook probably best suited for a first reading in the subject, Bourbaki's treatise is a systematic developement of the theory in a maximal reasonable generality and Encyclopaedia volume is a reference book listing results with a few proofs.

Homework There will be weekly homework assignments due on Friday by 3pm. You can bring it to my office or e-mail me the solution in any reasonable electronic format (including a scan of your handwritten paper).

In addition to the homeworks, the student is expected to write an expository **final paper** due on Monday, December 10. If you would like to do a take home final instead let me know at least 3 weeks before that date.

Course materials including homeworks will be posted at:
http : //math.mit.edu/ ∼ bezrukav
Office hours. M 3-4; you are also welcome to stop by my office any time, send me an e-mail in advance if you want to make sure I am available.