

SYLLABUS FOR
MATH 223A FALL 2011

0.1. **course.** Math 223a: Lie Algebras

MW 2-3:30

Math Dept Conference Room (2nd floor Goldsmith next to math office)

0.2. **instructor.** Kiyoshi Igusa

305 Goldsmith

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office hours to be announced

webpage for course

0.3. **topics covered.** (not necessarily in this order)

- (1) Basic definitions and examples
- (2) Structure theory of Lie Algebras
- (3) Correspondence between Lie Groups and Lie Algebras
- (4) Universal enveloping algebra
- (5) Semisimple Lie Algebras
- (6) Root systems
- (7) Representations
- (8) Theory of highest weights
- (9) Weyl character formula

0.4. **lecture format.** Standard lecture including detailed examples. Lecture notes will be posted. I also highly recommend the student lecture notes from Victor Kac course and the undergraduate text book “Introduction to Lie Algebras” by Erdmann and Wildon.

Homework problems will be assigned weekly but they are optional.

0.5. **books.** We will go through Chapters I-VI the book “Introduction to Lie Algebras and Representation Theory” by J. Humphreys with additional material from “Representation Theory” by Fulton and Harris.

0.6. **prerequisites.** This material uses linear algebra and basic algebra. For example, the basic example is the ring of endomorphisms of a finite dimensional vector space over a field. Math 101a should be sufficient. (See my Math 101a webpage).