

Course Information

Office: 266 Lockett Hall
Phone: 578-7990
E-mail: pramod@math.lsu.edu
Office hours: Tues. 2:00pm–3:30pm or by appointment

Overview. Lie algebras are essential in many areas of mathematics and theoretical physics. In this course, after covering the definition and basic properties of Lie algebras, we will study the structure theory of semisimple Lie algebras and the classification of simple Lie algebras, and then take a brief look at their representation theory. Throughout the course, we'll keep in mind the example of \mathfrak{sl}_2 , the smallest semisimple Lie algebra. It's small enough (only 3-dimensional) to easily do explicit calculations in, and at the same time interesting enough to give us a good idea of what goes on in higher-dimensional Lie algebras.

Textbook. For much of the semester, we will work from a set of notes by Anthony Henderson. These are available in PDF format on the *Blackboard* page for the course. **Important:** The author has requested that these notes not be made publicly available. In other words, don't post the PDF file on your own webpage. At various points in the semester, I will distribute supplementary notes from other sources.

Course outline. A tentative list of topics for the semester is as follows:

Definition and basic properties (Chapters 1–3)	1 week
Modules and Representations; \mathfrak{sl}_2 (Chapters 4–6)	2 weeks
Some Structure Theory (Chapters 7–8)	2 weeks
Classical Lie algebras (Chapters 9–10)	2 weeks
Borel and Cartan subalgebras (Chapter 11)	2 weeks
Universal enveloping algebras, Poincaré–Birkhoff–Witt theorem	1 week
Classification of simple Lie algebras (Chapter 12)	2 weeks
Verma modules	1 week
Other topics	1 week

Website. All class materials will be available on *Blackboard*.

Homework. Homework exercises will be due approximately once every two weeks. All the homework exercises will be posted on the *Blackboard* page for the course. It is likely that not every homework question will be graded.

Exams. There will be no timed exams. In lieu of a final exam, the last homework assignment will be due at the scheduled time for the final exam: Friday, December 14, 12:30pm.