

Math 6240, Lie Groups and Lie Algebras I

Meeting Time: MWF 9:40-10:30, LCB 218

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Office Hours: By appointment

Course Website: www.math.utah.edu/~ptrapa/6240.html

Course Description: This course (and its sequel) will cover the theory of Lie groups and Lie algebras. The first main objective of this course is understanding the Lie correspondence (describing how the structure of a Lie group is controlled by its Lie algebra). We will then use this to attack various classification problems (like the classification of connected compact Lie groups) using the theory of root systems for semisimple Lie algebras.

In parallel with the development of the general theory, the course will also focus on a large number of examples. We will also delve into topics related to the structure of root systems. Depending on student interest, this could include: the McKay correspondence; quiver representations; geometry of flag varieties; Schur-Weyl duality; and relations with the classification of reductive algebraic groups by root data.

Prerequisites: The prerequisites are modest (some differential geometry, some analysis, some algebra). In particular, the course will be accessible to all graduate students who have completed the standard first-year algebra, analysis, and geometry/topology courses.

Recommended Texts: *Lectures on Lie Groups* by Dragan Miličić available at

<https://www.math.utah.edu/~milicic/Eprints/lie.pdf>.

For some introductory material, we may also consult *Lie Groups* by Wulf Rossmann.

Evaluation: Grades will be based on homework sets, collected lectures notes, and in-class presentations.

ADA Statement: The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you will need accommodations in this class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, 801-581-5020. CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in an alternative format with prior notification to the Center for Disability Services.