

## Detailed Syllabus for MATH 6240-001 Fall 2024

### Lie Groups and Lie Algebras I

#### Course Description

**Instructor:** Dragan Miličić

**Office:** JWB LCB 104

**email:** milicic@math.utah.edu

**Days & time:** MoWe 12:25 PM - 01:45 PM

**Classroom:** ARCH 229

**Office Hours:** By appointment.

**Textbook:** Lectures on Lie Groups (available on my web page  
<http://www.math.utah.edu/~milicic/Eprints/lie.pdf>)

#### Topics to be covered:

- Lie groups, Lie subgroups, coset spaces, quotient Lie groups
- Lie group actions, orbits, orbit manifolds
- Covering groups, fundamental group of a connected Lie group, universal covering group of a connected Lie group
- Lie algebra of a Lie group, properties of the Lie algebra functor, equivalence of the category of simply connected Lie groups and the category of finite-dimensional real Lie algebras, Frobenius theorem and integral subgroups of Lie groups
- Exponential map, Cartan's theorem (closed subgroup of a Lie group is a Lie subgroup), continuous homomorphisms of Lie groups are differentiable
- Compact Lie groups, maximal tori, conjugacy of maximal tori, surjectivity of the exponential map for compact Lie groups