

## MATH 535: LIE THEORY II. ALGEBRAIC GROUPS

Algebraic groups are algebraic varieties with a compatible group structure. There are two main extreme cases: a projective variety with an abelian group structure, or an affine variety. This course is concerned with the latter case; it turns out that then such an algebraic group can be embedded (as a closed subgroup) into  $GL(n)$  for some  $n$ , and this is why such groups are called linear algebraic groups. This course is aimed at the study of algebraic groups over an algebraically closed field of characteristic zero; other topics (such as the situation over non-algebraically closed fields) might be introduced.

Approximate syllabus:

- (1) Algebraic groups: the definition and basic properties.
- (2) Derivations and the Lie algebras.
- (3) Solvable algebraic groups. Borel subgroups.
- (4) Classification of reductive algebraic groups over an algebraically closed field.
- (5) Other topics, e.g. rationality questions: non-algebraically closed fields of characteristic zero; or real forms of a complex algebraic group.

Suggested textbook: Springer, "Linear algebraic groups" (2nd edition)

Prerequisites (for this version): Math 534 and ideally, Math 532 (the latter not really required this year).