UNIVERSITÄT DES SAARLANDES
Fachrichtung Mathematik
Prof. Dr. R. Schulze-Pillot

UNIVERSITÄT DES SAARLANDES

In the summer semester 2018 I will teach a course on

Lie groups and Lie algebras.

Tuesday 8:30-10 SR 9, Thursday 10-12 SR 10(Lecture times are negotiable)

The course (4 hours lecture, 6CP) will be given in English if participants wish so, in German, if all participants are happy with that.
At present, the lecture times are in conflict with the times of Spezialvorlesung Algebra (Prof. Weitze-Schmithüsen) and Algebraische Geometrie (Prof. Schreyer). It should be possible to resolve these conflicts if they are relevant for participants.

Lie groups, named after the norwegian mathematician Sophus Lie, are groups with a differentiable structure which is compatible with the group structure. The simplest examples are the general or special linear groups over the real or complex numbers and subgroups of these, e. g. orthogonal, unitary, symplectic groups. The Lie algebra of such a group is the space of invariant differential operators, identified with its tangent space at the neutral element. These groups and algebras and their representations, i.e., actions on vector spaces, occur in many mathematical and physical contexts, e. g. geometry, analysis, number theory, quantum mechanics. The methods for their treatment are also relevant for the theory of algebraic groups; these are groups which have a compatible structure as an algebraic variety over some field. The course will treat the basic structure theory, including the connections between the Lie group and its Lie algebra and the classification of the semisimple Lie algebras, and then cover as much of the representation theory as fits into one semester.

Prerequisites: The basic courses in Analysis (1-3) and Linear Algebra (1-2) suffice

Literature:

- Bröcker, tom Dieck: Representations of compact Lie groups
- Bump: Lie groups
- Humphreys: Introduction to Lie algebras and representation theory
- Rossmann: Lie groups
- Varadarajan: Lie groups, Lie algebras, and their representations

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