

# Seminar: Representation theory of finite groups

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**Timings(Tentative):** Wednesdays 9–11am; INF 205, Room: TBD

**Target Group:** Bachelor students

**Prerequisites:** Knowledge of Linear Algebra 1-2 and Algebra 1 is expected.

**Requirements:** Talks are supposed to be in English. For each talk, duration is 90 minutes and a handout is expected.

**Brief description:** Representation theory is a branch of mathematics focusing on describing elements of algebraic objects in terms of a linear transformation of vector spaces. By a representation of an algebraic object  $G$ , let us say a group, we mean a group homomorphism  $\rho : G \rightarrow \mathrm{GL}(V)$  where  $V$  is a  $\mathbb{C}$ -vector space. The theory plays a crucial role, not only in mathematics but also other areas of science such as quantum chemistry, particle physics and quantum mechanics, just to name a few.

In this seminar, we primarily focus on the representation theory of finite groups. To be more precise, we aim to study the basics of linear representations, analyzing certain examples of them such as the representations of the group  $\mathfrak{A}_4$  of even permutations of a set of order 4, the group  $\mathfrak{S}_4$  of all the permutations of a set of order 4 and the dihedral groups. Furthermore, we study fundamental results of Artin and Brauer on the subject. The main sources throughout the seminar are the book *Linear representations of finite groups* by J. P. Serre and the book *Representation theory* by W. Fulton and J. Harris.

**Vorbesprechung:** (Monday) 22 January 2024, 14:00 (c.t.) in SR8, INF 205 (Mathematikon)

**Seminar homepage:** Please visit  
<https://typo.iwr.uni-heidelberg.de/groups/arith-geom/teaching>.