

# Algebra IV: Representation Theory

2h lecture at TU Berlin, SS 2017, Prof. P. Bürgisser

## Chap. 1. Representations of finite groups

- 1.1 Modules and representations
- 1.2 Submodules and reducibility
- 1.3 Morphisms and Schur's Lemma
- 1.4 Characters
- 1.5 Orthogonality relations
- 1.6 Decomposition of the group algebra
- 1.7 Tensor products

## Chap. 2. Representations of algebras

- 2.1 Semi-simple modules
- 2.2 Isotypical decomposition
- 2.3 Semi-simple algebras
- 2.4 Endomorphism algebras

## Chap. 3. Representations of $S_N$ and $GL(V)$

- 3.1 Polarisation and restitution
- 3.2 The rational representations of  $GL(V)$
- 3.3 Rational  $GL(V)$ -modules are semi-simple
- 3.4 The irreducible representations of  $S_N$
- 3.5 The decomposition of  $V^{\otimes N}$