Computational Representation Theory of Groups and Algebras.

In this series of three lectures, we will discuss matrix representations of finite groups
and how they are linked to the more general theory of representations of algebras in theory and on the
computer.

We will start with analyzing how groups arise in mathematics. This will be followed by a discussion of
the structure of an arbitrary finite group in terms of simple groups. We will then review the
classification of finite simple groups and the description of permutation representations of a finite group
in theory and in practice.

For the case of matrix representations we will look at the the current project of constructing the matrix
representations of finite simple groups and illustrate how past RTGs contributed to this project. Some of
the fundamental underlying algorithms will be discussed and we will play with their implementations in
the computer algebra system GAP. Finally, we will look at more advanced methods from the
representation theory of algebras and how they relate to the original aim of finding matrix
representations of a group.