INTRODUCTION TO REPRESENTATION THEORY

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Group actions appearing frequently in exact sciences, it is unlikely that a scientist will not come in contact, under various guises, with representations. The course is an introduction to the theory of group representations, with selected examples, intended for the general scientific public as well as students wishing to specialize in this field.

Syllabus

- General framework. Linear representations of finite groups. The case of the symmetric group.
- Linear representations of compact groups: extension of the previous framework.
- Character theory, induced representations, Frobenius theory.
- Projective representations, group extensions and group cohomology. Linearization of projective representations.
- Heisenberg and Weil representations. Representations of Lie groups. Schur-Weyl duality. Action of a group on a category (following Brylinski and Deligne).

Prerequisites

A fourth-year course in Algebra (including a part on the representations of finite groups) is recommended and useful. However, a good working knowledge of Linear Algebra and a basic knowledge of the theory of groups at third-year level are sufficient. Examples in the course from Algebraic Topology or Geometry will be reintroduced before being worked out.

Bibliography

Jean-Pierre Serre, représentations linéaires des groupes finis, Hermann.
David Kahzdan, lecture notes (his web page).
William Fulton, Joe Harris, representation theory - a first course.