

# CHARACTER THEORY OF FINITE GROUPS 2005-2006

## COURSE OUTLINE

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LECTURE SCHEDULE : Wednesday 2.00 in C219, Thursday 10.00 in IT206

## COURSE CONTENT

This course is an introduction to the representation theory and character theory of finite groups. The subject involves an interplay between group theory, ring theory and linear algebra. Representation theory is basically concerned with writing an abstract group as a group of matrices; this is desirable in principle since it gives a concrete description of the group. The study of the matrix representations of groups has proved valuable in proving purely group-theoretic results as well as being a major branch of modern algebra in its own right.

This course will begin with a look at some of the fundamental ideas of representation theory in Chapter 1 (including some statements without proof). In Chapter 2 we will cover the ring-theoretic requisites. In Chapter 3 we will develop the beautiful and powerful theory of characters, and in Chapter 4 we will use combinatorial methods to describe in detail the representation theory of the symmetric groups.

## SYLLABUS OUTLINE

**Chapter 1** Representations of Groups

**Chapter 2** The Group Algebra and its Simple Modules

**Chapter 3** Character Theory

**Chapter 4** The Irreducible Representations of the Symmetric Groups

## BOOKS

You may also find some of the following books helpful :

- James & Liebeck, *Representations and Characters of Groups*, 512.2
- Isaacs, *Character Theory of Finite Groups*, 512.2
- Ledermann, *Introduction to Group Characters*, 512.2
- Jacobson, *Basic Algebra II*, 512.9

## ASSESSMENT

20% of the mark for this course will be assigned for a series of (probably four) homework assignments. The remaining 80% will be assigned for the final written exam.