



# *The Hebrew University of Jerusalem*

## *Syllabus*

### **FUNDAMENTAL CONCEPTS IN REPRESENTATION THEORY - 80598**

*Last update 02-01-2024*

*HU Credits:* 6

*Degree/Cycle:* 2nd degree (Master)

*Responsible Department:* Mathematics

*Academic year:* 2024

*Semester:* 2nd Semester

*Teaching Languages:* English and Hebrew

*Campus:* E. Safra

*Course/Module Coordinator:* Prof. Yakov Varshavsky

*Coordinator Email:* [yakov.varshavsky@mail.huji.ac.il](mailto:yakov.varshavsky@mail.huji.ac.il)

*Coordinator Office Hours:* By appointment.

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Teaching Staff:

Prof Yakov Varshavsky,  
Ms. Noam Zimhoni

Course/Module description:

Introduction to the representation theory of finite groups and, if time allows, of compact, and locally-compact groups.

Notice! Additional, or other, topics might be taught.

Course/Module aims:

Learning outcomes - On successful completion of this module, students should be able to:

Familiarity with the fundamental notions of algebra. Familiarity with modules, and semisimple rings. Familiarity with the basics of the theory of group representations.

Attendance requirements(%):

none

Teaching arrangement and method of instruction: Lecture + exercise

Course/Module Content:

- \* Basics of representation theory of finite groups
- \* Modules over noncommutative rings
- \* Semisimple rings and modules
- \* Artin-Wedderburn theory
- \* Characters
- \* Induction, Frobenius reciprocity and Mackey theory

If time allows:

- \* Basics of representation theory of compact groups

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*Other or additional topics may be studied*

*Required Reading:*

*none*

*Additional Reading Material:*

*Fulton, Harris, Representation Theory*

*Folland, A Course in Abstract Harmonic Analysis*

*Serre, Linear Representations of Finite Groups*

*Kowalski's lecture notes:*

*<https://people.math.ethz.ch/~kowalski/representation-theory.pdf>*

*Grading Scheme:*

*Written / Oral / Practical Exam 70 %*

*Submission assignments during the semester: Exercises / Essays / Audits / Reports / Forum / Simulation / others 30 %*

*Additional information:*

*none*