The Hebrew University of Jerusalem

Syllabus

GEOMETRIC METHODS IN REPRESENTATION THEORY - 80772

Last update 03-03-2020

<u>HU Credits:</u> 3

<u>Degree/Cycle:</u> 2nd degree (Master)

<u>Responsible Department:</u> Mathematics

<u>Academic year:</u> 2024

<u>Semester:</u> 2nd Semester

<u>Teaching Languages:</u> English and Hebrew

<u>Campus:</u> E. Safra

<u>Course/Module Coordinator:</u> Prof Yakov Varshavsky

<u>Coordinator Email:</u> yakov.varshavsky@mail.huji.ac.il

<u>Coordinator Office Hours:</u> by appointment

Teaching Staff:
  Prof Yakov Varshavsky

Course/Module description:
   The goal of this course is to give a geometric construction (known as Springer correspondence)
of irreducible representations of the symmetric group.

In order to carry out the construction, we will study several very interesting and important
topics of independent interest, such as:

- Derived categories of sheaves and derived functors.

- Perverse sheaves (very mysterious objects with extremely nice properties, which have a lot
of nice applications, the most famous of which is the proof of "Fundamental lemma" by Ngo).

Remark: Springer correspondence, along with its generalizations due to Lusztig, plays a key role in
Lusztig's classification of the irreducible representations of "finite groups of Lie type" and hence
has applications to the local Langlands correspondence.

Prerequisites: Basic algebraic geometry, basic category theory, notion of sheaves.

Course/Module aims:
  _N/A_

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

Attendance requirements(%):
  _0_

Teaching arrangement and method of instruction: lecture

Course/Module Content:
  TBA

Required Reading:
 No

 Additional Reading Material:
  Neil Chriss and Victor Ginzburg "Representation theory and complex geometry"

Dasten Clausen "The Springer correspondence"
https://www.math.harvard.edu/media/clausen.pdf

 Grading Scheme:

Additional information:
  No