

Syllabus

1. Course Description
 - a. Title of a Course : Research Seminar "Combinatorics of Vassiliev Invariants 2"(M. E. Kazarian, S. K. Lando).
 - b. Pre-requisites : no
 - c. Course Type : optional
 - d. Abstract : This students' research seminar is devoted to combinatorial problems arising in knot theory. The topics include finite order knot invariants, graph invariants, matroids, delta-matroids, integrable systems and their combinatorial solutions. Hopf algebras of various combinatorial species are studied. Seminar's participants give talks following recent research papers in the area and explaining results of their own.
2. Learning Objectives

The seminar is intended to introduce the subject area to the students, and to offer them an opportunity to prepare and give a talk.
3. Learning Outcomes

Successful participants improve their presentation skills and prepare for participation in research projects in the subject area.
4. Course Plan :
 - 1) Weight systems.
 - 2) Constructing weight systems from Lie algebras.
 - 3) Hopf algebras of graphs, chord diagrams and delta-matroids.
 - 4) Combinatorial solutions to integrable hierarchies.
 - 5) Khovanov homology.
5. Reading List
 - a. Required

S. Chmutov, S. Duzhin, Y. Mostovoy. CDBook. CUP, 2012.
<http://www.pdmi.ras.ru/~duzhin/papers/cdbook/cdbook.pdf>
 - b. Optional

A. Hatcher. Algebraic Topology. Cambridge University Press, 2001
<http://www.math.cornell.edu/~hatcher/AT/ATpage.html>
6. Grading System

The mark depends on the seminar talk.

7. Guidelines for Knowledge Assessment

Examples of talk titles:

- Wheeling Theorem and hyperkahler geometry
- Legendrian knots
- Interlace polynomial
- The Bernstein homomorphism via Aguiar-Bergeron-Sottile universality
- Cluster algebras and Jones polynomials
- A combinatorial proof of Postnikov's identity and a generalized enumeration of labeled trees
- Graph invariants related to statistical mechanical models

8. Methods of Instruction

Students are individually assigned papers and textbook excerpts to give a seminar talk.

9. Special Equipment and Software Support : no requirements