

MATH 590
SEMINAR IN ASYMPTOTIC ALGEBRAIC COMBINATORICS
SPRING 2024 SYLLABUS

GRETA PANOVA

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Location and meeting times: We will be meeting on average 1.5 academic hours per week. The meetings in January and February will be on zoom. In March and April you'd attend two week long workshops at IPAM (can be watched online as well) and we will have discussions based on the talks you'll see.

Course description. This seminar course will cover topics at the intersection of asymptotics, statistical mechanics and algebraic combinatorics. It will be associated with the IPAM long program "Geometry, Statistical Mechanics and Integrability" and students are expected to attend talks during the first two program workshops (registration fees will be waived for students registered for this class). Possible topics to be covered during the seminar meetings: longest increasing subsequences of permutations and the Tracy-Widom distribution of eigenvalues of random matrices; asymptotics of standard Young tableaux; 6-vertex model and alternating sign matrices; lozenge tilings and plane partitions; asymptotics of structure constants. Students will be expected to give a short presentation on a recent research paper.

Link to the IPAM program: <https://www.ipam.ucla.edu/programs/long-programs/geometry-statistical-mechanics-and-integrability/>.

Prerequisites. Combinatorics (Math 532 or equivalent), Analysis (Math 425 or equivalent); or explicit permission from the instructor.

Textbooks and sources.

[RS] Richard Stanley, *Enumerative combinatorics, volume 1 and 2*.

[RK] Richard Kenyon, *Lectures on dimers*, <https://arxiv.org/pdf/0910.3129.pdf>.

[VG] Vadim Gorin, *Lectures on random lozenge tilings*, https://people.math.wisc.edu/~vadicgor/Random_tilings.pdf.

[DR] Dan Romik, *The Surprising Mathematics of Longest Increasing Subsequences*, <https://www.math.ucdavis.edu/~romik/book/>.

[GP] Greta Panova, *Lectures on Asymptotic Algebraic Combinatorics* at CMI-HIRM summer school on Integrable Probability (2020) (<https://www.claymath.org/events/cmi-himr-integrable-probability-summer-school/>) and Summer school on Algebraic, Asymptotic and Enumerative Combinatorics, Bedlewo, Poland (2023).

Course notes and materials. All notes and other materials will be uploaded on the course website (assigned by USC).

STATEMENT OF ACADEMIC CONDUCT AND SUPPORT SYSTEMS

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on Research and Scholarship Misconduct.

Students and Disability Accommodations:

USC welcomes students with disabilities into all of the University’s educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Support Systems:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call studenthealth.usc.edu/counseling Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call suicidepreventionlifeline.org Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press “0” after hours – 24/7 on call studenthealth.usc.edu/sexual-assault Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - (213) 740-5086 eeotix.usc.edu Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298 usc-advocate.symplicity.com/care_report Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

The Office of Student Accessibility Services (OSAS) - (213) 740-0776 osas.usc.edu OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy. USC Campus Support and Intervention - (213) 821-4710 campussupport.usc.edu Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity, Equity and Inclusion - (213) 740-2101 diversity.usc.edu Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call dps.usc.edu, emergency.usc.edu Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call dps.usc.edu Non-emergency assistance or information.

Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC) ombuds.usc.edu A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

Occupational Therapy Faculty Practice - (323) 442-3340 or otfp@med.usc.edu chan.usc.edu/otfp Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.