Random Fractals
2024/25 II. Semester

Neptun code: BMETE95MM46
Lecturer: Dr. Balázs Bárány

Prerequisites: This is an elective subject for MSc and PhD students. Probability Theory 1 is necessary for BSc students. There are no further prerequisites.

Topics:

- Introduction to Iterated Function Systems and geometric measure theory;
- Introduction of the tools from probability theory: branching processes, large deviation principle, martingale convergence;
- Fractal percolations: construction, elementary properties, dimension, connectivity, orthogonal projections;
- Statistically self-similar sets: random perturbation of translations, dimension, measure, and interior point;
- Random cookie-cutter sets: construction, dimension

Requirements: The subject ends with a written exam of theoretical questions. There are two options to complete the subject:

- Writing the 90-minute-long test with two theoretical questions; each question worth 50-50 points.
- Hold a 30-minute mini-lecture on the 13th-14th week, which is worked out by the student on his/her own about a recent paper in the field, and write the 90-minute-long exam with one theoretical question. The instructor should approve the topic of the mini-lecture. The student can gain 50-50 points on both the mini-lecture and the exam.

Materials for the mini-lecture can be requested from the lecturer during the semester. The final score is the sum of the points of the two theoretical questions on the exam, or the sum of the points of the mini-lecture and one theoretical question. The final grade based on the earned points is as follows:

0—39: fail (1)
40—54: pass (2)
55—69: satisfactory (3)
70—84: good (4)
85—100: excellent (5)

2nd February 2025. (modified on 24th May 2025)

Balázs Bárány
Lecturer.