

# Bocconi Summer School in Advanced Statistics & Probability

2022 edition in collaboration with University of Oxford and Imperial College London

## Random Structures and Combinatorial Statistics, 11-21 July 2022

*Lake Como School of Advanced Studies, July 11-21, 2022*

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## Home

The Bocconi Summer School in Advanced Statistics and Probability is hosted by the Lake Como School of Advanced Studies at Villa del Grumello, on the shores of the Lake of Como, usually in July. The School continues the tradition of the Summer Schools in Statistics and Probability that Università Bocconi had been organizing since the early '90s, and held in Torgnon, Val d'Aosta, until 2008.

The aim of the Bocconi Summer School in Advanced Statistics and Probability is to establish a track of high level courses on advanced and cutting-edge topics in Statistics and Probability. The Summer School offers lectures delivered by internationally leading scholars on the specific designated topic, and supervised tutorials.

The **2022 edition** (July 11-21, 2022) is organized and offered by [Università Bocconi](#) in collaboration with the [University of Oxford](#) and [Imperial College London](#) within the [EPSRC CDT \(Centre for Doctoral Training\) in Modern Statistics and Statistical Machine Learning](#).

The topic of the 2022 edition is **Random structures and combinational statistics** and the main instructor are **Luc Devroye** (McGill University, Montreal) – **Gabor Lugosi** (Universitat Pompeu Fabra, Barcelona)

Up to two Awards, covering the registration fee, will be conferred by the Bocconi Institute of Data Science ([BIDSA](#)) to outstanding applicants.

### Steering Committee

Prof. Sonia Petrone (Università Bocconi) – Director  
 Prof. Pietro Muliere (Università Bocconi)  
 Prof. Judith Rousseau (University of Oxford)  
 Prof. Patrick Rebeschini (University of Oxford)

### Past Editions

[2017: Statistical Causal Learning](#)

[2018: Graphical models](#)

[2019: Random Graphs and Complex Networks](#)



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## Program

### Random structures and combinatorial statistics

We review selected statistical problems that have a nontrivial combinatorial component. These include the hidden clique problem in a random graph, combinatorial Gaussian hypothesis testing, broadcasting on trees, and network archeology.

We will introduce the students to the most common random tree and graph models, including the Galton-Watson trees, the uniform random recursive tree, the preferential attachment tree, the random binary search tree, and the Erdos-Renyi graph.

#### Lectures

**Luc Devroye**, School of Computer Science, McGill University, Montreal

**Gabor Lugosi**, Universitat Pompeu Fabra, Barcelona

#### Tutorials

**Anna Brandenberger**, Perimeter Institute for Theoretical Physics.

**Jad Hamdan**, McGill University, Montreal

**Marcel Goh**, McGill University, Montreal

#### Format

Morning: 3-4 hours/day lectures

Afternoon: 2 hours/day supervised tutorials as well as individual and team work.

Moreover, there will be a **poster session**, where participants, upon previous request, may present their research. A welcome cocktail will be offered during the poster session. More detailed info to follow.

#### Room and board

Accommodation is included in the registration fee.

The students will be hosted at the [Guest House of Villa del Grumello](#) and at [Hotel Engadina](#) and [Hotel Park](#).

The organizing committee will take care of the reservation.

Working days' lunches are included in the registration fees.

#### Attendance and final certificate

Full attendance of the activities of the summer school is mandatory for the participants.

Subject to a positive participation to the program, an attendance certificate will be awarded by Università Bocconi, mentioning that the 2022 edition of the Summer School is offered in collaboration with University of Oxford and Imperial College London.



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Schedule

LECTURES: DAILY SCHEDULE

<p>LECTURES will start on <b>Monday July 11 at 10 am</b></p> <p><b>Day 1 schedule:</b></p> <p>welcome &amp; info 9:45</p> <p>Lectures 10-11:30 - break - 11-12:45 (day 1)</p> <p>*lunch*</p> <p>Exercise sessions (one-hour) and team work.</p>
<p>Lectures: daily schedule</p>
<p><b>WEEK 1</b> (Gabor Lugosi)</p> <p>Days 1 &amp; 2: Concentration inequalities. Chernoff bounds: Hoeffding, Efron-Stein, and McDiarmid's inequalities.</p> <p>Days 3 &amp; 4: The hidden clique problem. Introduction to Erdős-Rényi random graphs, clique number, first and second moment methods, spectral methods.</p> <p>Day 5: Root finding and root-bit estimation in uniform random recursive trees.</p>
<p><b>WEEK 2</b> (Luc Devroe)</p> <p>Day 1: Galton-Watson trees. Basic properties. Simply generated trees. Spine decomposition of trees conditioned to be of size n. The continuum random tree and convergence to the Brownian excursion.</p> <p>Day 2: Random graphs including birth of the giant, size of the giant, and connectivity. Erdos-Renyi graphs, k-out graphs and other models.</p> <p>Day 3: Random binary search tree, uniform random recursive tree, preferential attachment trees.</p> <p>Day 4: Root bit estimation in the Ising model. Solvability and census solvability. Information-theoretic lower bounds. Relationship with Galton-Watson trees.</p> <p>-----</p> <p><b>Typed lecture notes with exercises will be made available on day 1.</b></p> <p>Further material can be made available to participants on the school website.</p> <p>-----</p>



# Bocconi Summer School in Advanced Statistics and Probability

Lake Como School of Advanced Studies - July 8-19, 2019

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## Photo & Video



Group photo, Bocconi Summer School in Advanced Statistics and Probability  
July 8-19, 2019

