



Università Commerciale  
Luigi Bocconi

# Bocconi Summer School in Advanced Statistics and Probability: Statistical Causal Learning

*Lake Como School of Advances Studies*

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## Home

The Bocconi Summer School in Advanced Statistics and Probability is offered by [Università Bocconi](#), Milan, and 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.

Its first edition, on [Statistical Causal Learning](#), will take place on **July 10-22, 2017**

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 will feature lectures delivered by internationally leading scholars on the designated topic, and supervised tutorials.

The School continues the tradition of the Summer Schools in Statistics and Probability that Bocconi University had been organizing since the early '90s, and held in Torgnon, Val d'Aosta, until 2008.

### Directors

Prof. Sonia Petrone (Bocconi University)

Prof. Pietro Muliere (Bocconi University)

[PhD Università Bocconi.](#)





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## Application

### ▪ Target Participants

The Summer School is designed for PhD students, and possibly brilliant MSc graduates / final-year students interested in pursuing doctoral studies in Statistics, Probability, Computer Science, Applied Mathematics, Operation Research and related areas

Lectures are in English.

In order to foster active interaction among students and instructors, the School is targeted for **a class of at most 30** qualified and selected participants.

The class group will include some students of the [PhD in Statistics of Università Bocconi](#).

### ▪ Selection criteria

Selection of the participants will be mainly based on the quality of the curriculum. The Organizing Committee will also consider other relevant aspects of candidates' application such as: the coherence of the motivation with the aim and scope of the school, the potential benefit for the student's research and the timeliness for the development of the student's career.

Required documents for applying:

1) [Personal CV](#):

Education, work experience, language skills and other relevant info.

2) [Academic records](#):

– for PhD students: PhD exams transcript (if applicable)

– for MSc students and graduates: transcript of MSc exams

3) [Referees](#):

Up to 2 referees' contact details (name, institution and e-mail address)

4) [Statement of purpose](#):

Short description of (max 1200 words):

– academic background in statistics, probability and/or other related areas

– research interests

– motivation for participating in the Summer School

Name

Surname

Gender

Institution

Street

Postal zip code

City

Country

Telephone number

E-mail address

Referees

Curriculum vitae (2 pages) [pdf, max 2MB]

[Scegli il file](#)

Nessun file scelto

Academic records Transcript (2 pages) [pdf, max 2MB]

[Scegli il file](#)

Nessun file scelto

Statement of purpose (2 pages) [pdf, max 2MB]

[Scegli il file](#)

Nessun file scelto

☐ By submitting this application form you authorise Fondazione Alessandro Volta to include your personal data on its mailing list for the distribution of information material. In accordance with the Law 196/2003, you may have access to these details at any time and request their modification and cancellation.

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## **Contact Us**

- For info, contact  
[bss.statistics@unibocconi.it](mailto:bss.statistics@unibocconi.it)



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## Important Deadlines

- Closing date for application: **by April 7, 2017**
- Notification of admission: **by April 22, 2017**
- Registration of admitted candidates: **by May 7, 2017**

All applicants will be notified via e-mail about their admission result (i.e.: admitted in the main list, in the waiting list, or not admitted due to excess demand). Should any place become available, candidates in the waiting list will be soon notified by email.





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## Photo







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## Program

### Statistical Causal Learning

In machine learning, we use data to automatically find dependences in the world, with the goal of predicting future observations. Most machine learning methods rely on statistics, and we will both discuss the theory underlying statistical learning as well as kernel machines building upon the theory.

However, statistical dependencies arise due to a more fundamental connection between variables: causality. Can causal knowledge help prediction in machine learning tasks? We argue that this is indeed the case, due to the fact that causal models are more robust to changes that occur in real world datasets. We provide some theoretical results as well as algorithmic approaches, and we touch upon the implications of causal models for machine learning tasks such as domain adaptation, transfer learning, and semi-supervised learning. Some of the causal problems are conceptually harder, however, the causal point of view can provide additional insights that have substantial potential for data analysis.

Time permitting, we will also present an application of causal modeling to the removal of systematic errors for the purpose of exoplanet detection.

#### Instructors

**Bernhard Schölkopf**

(Empirical Inference Department Director, Max Planck Institute for Intelligent Systems, Tübingen);

**Ilya Tolstikhin**

(Research Scientist, Max Plank Institute for Intelligent Systems, Tübingen);

**David Lopez-Paz**

(Researcher at Facebook AI Research, Paris).

#### Format

Morning: 3 hours/day lectures

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

#### Room and board

Accommodation is included in the registration fees.

Students will be hosted at the Guest House of Villa del Grumello, and in other facilities in the surroundings.

The organizers of the Summer School will take care of the reservations

Working days' lunches are included in the registration fees, while dinners are not.

#### Attendance and final certificate

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

An attendance certificate will be awarded by Università Bocconi, subject to a positive participation to the program.







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## Registration

**Registration fee: € 450 (VAT free)**

The fee covers the school activities and course material; wi-fi connections; lunches and accommodation for the 2 weeks (July 9 – July 22, 2017)

Admitted applicants on the main list register by accessing the "[Paytool – registration area](#)"

Deadline closing date for application: April 7, 2017 Notification of admission: by April 22, 2017 **Registration of admitted candidates: by May 14, 2017.** "Registration is confirmed only upon filling in the [Paytool](#) registration form and payment of the registration fee."

Should any candidates in the main list decline the offer, candidates in the waiting list will be notified by email so that they can register.

Upon registration, participants will be notified about their accommodation.

### **BIDSA fee-waivers**

The Bocconi Institute of Data Science (BIDSA) will confer up to two Awards, covering the registration fee, to outstanding applicants.





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## Schedule

[schedule-topics-summerSchool-2017](#)

Date	Morning	Afternoon	Lecturer	Instructor
Monday 10/07	Introduction to learning theory	Basics of math, recap	Ilya	Ilya
Tuesday 11/07	Learnability of finite classes	Blackboard theory exercises	Ilya	Ilya
Wednesday 12/07	Binary classification, VC dimension	Blackboard theory exercises	Ilya	Ilya
Thursday 13/07	Beyond classification	Introduction to RKHSs	Ilya	Bernhard
Friday 14/07	Kernel Algorithms	Kernel Mean Embeddings	Bernhard	Bernhard
Monday 17/07	Introduction to causality	Introduction to PyTorch	Bernhard	David
Tuesday 18/07	Bivariate causal discovery	Prediction challenge	Bernhard	David
Wednesday 19/07	Multivariate causal discovery	Bivariate Causal Discovery	David	David
Thursday 20/07	Potential Outcomes	Potential Outcomes	David	David
Friday 21/07	Invariant causal prediction	Causality challenge	David	David





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## Venues And Accommodation

### Course Location:



Lake Como School of Advanced Studies, Villa del Grumello, Como, Italy.

Placed in a central position within Europe, close to four international airports, it is hosted in an outstanding old noble palace located on the shoreline of beautiful Lake Como. The School is an international research facility running short term programmes on a wide range of interdisciplinary subjects, sharing a common focus on complex systems. The School attracts leading scholars in different fields including: physics, biology, economics, sociology,

geopolitics, education, environmental and development studies, to engage in collaborative research. In small teams, visitors explore questions at the cutting edge of science and knowledge. In a context of globalization and in front of the increasing interaction between various kinds of networks, the analysis of complex systems offers insights into economic development, social cohesion and the environment on many geographical scales.

**Venue** The school will be held at Villa del Grumello, Via per Cernobbio 11, Como (Italy).

**HOW TO GET THERE:** <http://lakecomoschool.org/contact/travel-info/>

Villa del Grumello is 20 min on foot from Como city center – you can also take a bus, lines 6 and 11 (bus stop: “Como Via Regina Piscine Villa Olmo”, just after “Villa Olmo”).

From the main Train Station (Como S. Giovanni), the nearest bus stop to catch line 6 and 11 is “Piazzale Rocchetto”.

