This program trains students in statistical thinking, methods, visualization and computation and in their application in data analysis. It is intended for students with strong mathematical and computational skills and a scientific or engineering background who want to give themselves crucial skills for sound reasoning in a data-flooded world.
Allocation of scarce coronavirus treatments

**Professor Mats Stensrud**

The COVID-19 pandemic has placed tremendous strain on health care systems around the world. We have experienced shortages of protective equipment, intensive care units, doctors and vaccines. When resources are limited, decision makers are faced with the ethical challenge of determining allocation strategies.

The justification for an allocation strategy should ideally be supported by evidence from randomized experiments; that is, experiments designed to target the causal effects of the strategy on the outcome of interest, for example how different prioritization policies for COVID-19 vaccines would affect mortality in the population. However, such evidence is often lacking because experiments can be unethical, costly, time-consuming and infeasible in practice. Furthermore, even if experimental data exist, these data cannot be immediately used to answer practical questions in many limited-resource settings, due to the complex nature of the strategies and the dependence structure induced by the resource limitations.

Theory has recently been developed to study the effects of allocation strategies, even if data from ideal experiments are lacking. This theory builds on a so-called counterfactual framework for causal inference, which considers what can be learned from allocations that did not actually happen, and can be used to improve studies that aim to guide future policies in medicine, public health and beyond.

Surface drifters

**Professor Sofia Olhede**

Understanding changes in ocean currents is crucial to modeling the likely effects of global heating on our future climate, to forecasting the ecological effects of oil spills and other types of pollution, and to deepening our knowledge of ocean fluid dynamics. Ocean circulation is measured by buoys known as surface drifters, which send their positions, sea surface temperature and other information to passing satellites at irregular time intervals.

The quantity of such data is now massive, but extracting information from them depends on correct modeling of these space-time measurements, handling missing data and taking into account known physical constraints. Time series data are very common in all domains of science, social science, economics and finance, and many other areas, but drifter time series are very complex and require the development of new models and methods that can distinguish a small signal in a lot of noise, finding a needle in a haystack. Similar problems also arise in the detection of exoplanets, in genetic analysis of rare diseases and many other areas of modern science, but also in areas such as fraud detection, all of which require advanced statistical modeling of very large, and often very complex, data sets.
Master of Science in **STATISTICS**

2-year program - 120 ECTS

### Core courses
- 30 ECTS

### Options
- 24 ECTS
- Internship in research lab (EPFL) or industry
- 30 ECTS
- Project in social and human sciences
- 6 ECTS
- Master’s thesis
- 30 ECTS

Students may choose a minor (30 ECTS) e.g.:
- Computational science and engineering
- Computer science
- Data science
- Environmental science and engineering
- Financial engineering

### Career prospects
After graduation, students can directly enter the job market or continue their university studies by applying to a doctoral program. The realization that ‘data is the new oil’ means that statisticians and data analysts are sought-after and valued in every domain of industry, economics, finance, government, science, and in the health and social sciences, so students’ imagination and personal interests will define how the skills obtained in this MSc can be applied on whatever path a graduate chooses later. The combination of a theoretical background, experience with cutting-edge computational techniques, practical team-working and communication skills that the courses provide will make graduates valued collaborators in any data-rich environment.

### Entry requirements
- A Bachelor’s degree in Mathematics with an excellent academic record
- Holders of a Bachelor’s degree in Physics or a field related to mathematics may also apply