MATH-614

Foundations of causal inference

Stensrud Mats Julius

Cursus	Sem.	Type
Mathematics		Opt.

Language of teaching	English
Credits	4
Session	
Exam	Oral presentation
Workload	120h
Hours	**84**
Lecture	28
Practical work	56
Number of positions	

Frequency

Every year

Remark

Fall semester

Summary

This seminar will provide a survey of the canonical literature in causal inference. At the end of this course, students will gain a broad understanding of the most important methodological concepts and tools in this field, and will be equipped to critically engage and contextualize modern literature

Content

The seminar will be discussion-based and require that the student actively participate. Each week, the discussion will be organized around 2-4 papers or book chapters that are relevant to a selected topic. The sessions will begin with a twenty minute presentation by the lecturer, followed by 70 minutes of discussion moderated by two volunteer students. The two responsible students will work closely with course instructors during the preceding week to design an effective session.

The topics we cover will include:
- Statistical inference vs causal inference: Concepts and terminology
- Description, prediction and counterfactuals
- Identifiability of causal effects in the presence of unmeasured confounding
- Bounds and sensitivity analysis
- Mechanisms and mediation analysis
- Generalizability and external validity
- Collapsibility

Keywords

Causality, Causal graphs, Structural Equation Modelling, Identification, Data Science

Learning Prerequisites

Required courses

Familiarity with statistical theory, probability theory and linear algebra.

Learning Outcomes

By the end of the course, the student must be able to:

- Understand central concepts in causal inference, with a particular focus on their underlying ontology and on ideas that are not present in traditional statistical inference. Demonstrate familiarity with ongoing academic disagreements within causal inference, and meaningfully discuss the advantages and disadvantages of each perspective
- Read, evaluate and critique papers that introduce new ideas into the methodological literature

Resources

Bibliography

We will give a list of relevant articles and book chapters.

Moodle Link

- https://go.epfl.ch/MATH-614