

## Thematical Seminar - Optimal Mass Transport

This student seminar is intended as an introduction to the problem of optimal mass transport. This problem asks for the most efficient way to move one distribution of mass to another distribution, relative to a given cost function. The theory of optimal mass transport has had a long history dating back to Monge in the 18th century. We will mostly follow the books [1] and [2], other resources include [3]. The basic requirements for following the seminar are the mandatory first and second year courses in mathematics as well as some familiarity with basic measure theory.

The seminar will start in the second week of the semester and will take place on Wednesdays from 15:15 - 17:00 in the Physics building, Room 2.52. Please register for the seminar by sending an email to Stefan Wenger (stefan.wenger@unifr.ch) by 24 September 2023. All talks will be distributed during the first meeting on Wednesday 27 September 2023, and participation in this meeting is mandatory!

### Schedule and topics

27.09.2023	Distribution of topics
04.10.2023	Overview talk
11.10.2023	Monge and Kantorovich problems
18.10.2023	Kantorovich-Rubinstein Duality I
25.10.2023	Kantorovich-Rubinstein Duality II
01.11.2023	no talk (Toussaint)
08.11.2023	Existence of optimal transport maps
15.11.2023	no talk (Dies academicus)
22.11.2023	Counterexamples and applications
29.11.2023	Transport problems with linear cost I
06.12.2023	Transport problems with linear cost II
13.12.2023	Transport problems with $L^\infty$ cost
20.12.2023	The Wasserstein distance

Version of 12 September 2023

### References

- [1] Luigi Ambrosio, Elia Brué, and Daniele Semola. *Lectures on optimal transport*, volume 130 of *Unitext*. Springer, Cham, [2021] ©2021. La Matematica per il 3+2.
- [2] Filippo Santambrogio. *Optimal transport for applied mathematicians*, volume 87 of *Progress in Nonlinear Differential Equations and their Applications*. Birkhäuser/Springer, Cham, 2015. Calculus of variations, PDEs, and modeling.
- [3] Cédric Villani. *Optimal transport*, volume 338 of *Grundlehren der mathematischen Wissenschaften [Fundamental Principles of Mathematical Sciences]*. Springer-Verlag, Berlin, 2009. Old and new.