

## M2RI — Syllabus: Convergence of probability measures, infinite dimensional limit theorems and optimal transport

**Link :** <https://www.math.univ-toulouse.fr/~rchhaibi/teaching/2021/M2RI/>

### Objectives :

- To explore the topology of the space of probability measures on a Polish space.
- To face limit theorems in infinite dimension.
- Complete your understanding of probability measures and their geometry thanks to optimal transport.

**Keywords:** Convergence in law, Polish space, Prokhorov's theorem, Donsker's theorem, optimal transport.

### Content :

- Part 1: Convergence of probability measures  
Probability measures on Polish spaces. Convergence in law / weak topology. Prokhorov's theorem.
- Part 2: Limit theorems in infinite dimension  
Weak compactness on the space of continuous functions. Donsker's theorem.
- Part 3: Optimal transport  
Kantorovich duality. Brenier's theorem: Existence of transport maps. Sinkhorn's algorithm and entropic regularization.

### Bibliographical references :

P. Billingsley. Convergence of probability measures.

C. Villani. Topics in optimal transport.

### Evaluation methods :

Continuous assessment: none

Final exam: written test