

MATH-442

**Statistical theory**

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Cursus	Sem.	Type
Data Science	MA2, MA4	Opt.
Ing.-math	MA2, MA4	Opt.
Mathématicien	MA2	Opt.
Statistics	MA2, MA4	Opt.

Language of teaching	English
Credits	5
Session	Summer
Semester	Spring
Exam	Written
Workload	150h
Weeks	14
<b>Hours</b>	<b>4 weekly</b>
Courses	2 weekly
Exercises	2 weekly
<b>Number of positions</b>	

**Summary**

-This course gives a mostly rigorous treatment of some statistical methods outside the context of standard likelihood theory.

**Content**

Review of decision and likelihood theory in parametric models. Shrinkage and superefficient estimators. Adaptive estimation. kNN classification. Optimal transport and application to the bootstrap. If time permits, M-estimation.

**Keywords**

Nonparametrics, inference, optimal transport, classification, shrinkage

**Learning Prerequisites****Required courses**

Courses on basic probability and statistics (e.g., MATH-240, MATH-230)

**Recommended courses**

Probability theory (MATH-432), Measures and integration (MATH-303)

**Important concepts to start the course**

Nothing specific is strictly necessary, but the pace will assume some level of mathematical and statistical maturity.

**Expected student activities**

Attending and actively interacting during lectures.

**Assessment methods**

Final written exam.

**Supervision**

Office hours	No
Assistants	Yes
Forum	Yes

**Resources**

**Virtual desktop infrastructure (VDI)**

No

**Notes/Handbook**

There will be lecture notes.

**Moodle Link**

- <https://go.epfl.ch/MATH-442>