

# Asymptotic statistics

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The goal of this course is to introduce classical asymptotic results in parametric and non-parametric statistics, and some of the tools that can be used to establish these results. The course will be illustrated using examples in estimation and regression.

After a reminder on basic topics in parametric estimation (least squares estimation, consistency and asymptotic normality of maximum likelihood estimators in regular models), the first part of the course will study non-parametric estimation [1], with a focus on kernel density estimation and non-parametric regression. The following topics will be covered: bias-variance tradeoffs, convergence rates of estimators in Hölder classes, minimax lower bounds, curse of dimensionality.

The second part of the course will focus on more advanced topics in parametric estimation [2]. We will address consistency and asymptotic normality of general M and Z estimators. We will then study the notions of contiguity, local asymptotic normality and efficiency.

## References

[1] Tsybakov, A. B. (2009). Introduction to nonparametric estimation. Revised and extended from the 2004 French original. Translated by Vladimir Zaiats.

[2] Van der Vaart, A. W. (2000). Asymptotic statistics (Cambridge series in statistical and probabilistic mathematics).