



# École doctorale de Physique en Île de France

ED564

Université PSL – Sorbonne Université –

Université de Paris – Université Paris-Saclay

<https://www.edpif.org>

## COURS

### Practical Data Analysis

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Performing research in experimental physics involves acquiring, processing, analyzing and interpreting data with much higher proficiency than typically required during undergraduate studies. In particular, a rigorous treatment of measurement uncertainties is crucial for a proper validation of the hypotheses motivating the experiments. We aim to bridge this gap both at the theoretical and the practical level, so each session will consist of a lecture to introduce the concepts and a computer-based practical part where they will be applied. We will discuss the following topics:

- Probabilities: random variables, distribution laws, moments
- Error and uncertainty: definitions, error propagation and composition
- Linear fitting: weighting, parameter uncertainty
- Nonlinear fitting: algorithms, constraints, difficulties
- Statistical learning: Singular Value Decomposition, Principal Component Analysis, neural network
- Introduction to Bayesian theory

Due to space constraints, attendance will be limited to **15 participants**. The lectures will be given in a room equipped with computers. Practicals will be carried out with Python. Depending on the audience, the course will be given in either **English or French**.

Eight three-hour sessions (1.5 hour lecture and 1.5 hour practicals)

From **9:30am to 5:00pm** every Wednesday starting **May 11<sup>th</sup>**.

Bâtiment d'enseignement de la physique (bâtiment 625 "h-barre"), Université Paris-Saclay

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