LC Introduction to Probability and Statistics

MSci Physics w/ Particle Physics and Cosmology
University of Birmingham

Year 1, Semester 1
Ash Stewart

Lectures Index

Wed 01 Oct 2025 12:00

Lecture 1 - Introdution and Descriptive Statistics

Course Welcome

- First half of the semester: Statistics
- Second hald the of semester: Probability
- All slides and notes on Canvas.

Why Descriptive Statistics? If we want to share an interesting bit of data, sharing the whole data is going to be confusing. Instead, we can share a small number of stats which describe and summarise the data.

Sample Statistics

One of the most simple is the number of samples (N), and the sample mean:

$$\text{Sample Mean: } \bar{x} = \frac{1}{N}\sum_{i=1}^{N} x_i$$

We can also calculate the sample standard deviation as the average of mean squared error across the points in the sample:

$$\text{Sample STDev: } s_n^2 = \frac{1}{N}\sum_{i=1}^{N}(x_i - \bar{x})^2$$

We can also use median or mode as measures of central tendancy. The mode is a poor estimator however (as it massively depends on how binning is done, for a continuous measurement), while the median is more resistant to outliers.

Thu 02 Oct 2025 09:00

Lecture 2