Overview

The course will cover the following topics:

- Counting and combinatorics
- Discrete and continuous probability
- Conditional probability and Bayes' Rule
- Random variables
- Expectation, variance, and correlation
- Common distribution families
- Probabilistic inequalities and concentration
- Moments and limit theorems
- Hypothesis testing
- Sampling and confidence intervals
- PCA and regression
- Entropy and compression

Learning Objectives

The course will teach you how to visualize, understand, and reason about probabilistic and statistical concepts, and how to apply your knowledge to analyze data sets and draw meaningful conclusions from data. We will cover both theoretical and practical aspects, and will start each topic with motivation and intuition and will proceed with rigorous arguments and provable techniques. Each topic will be accompanied by a Python Notebook that you could run and modify to experiment with the material learned and get a better feel for the material covered.