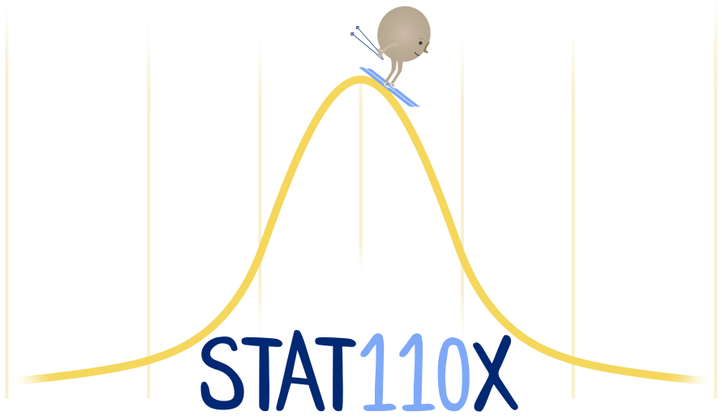
Welcome to STAT110x!

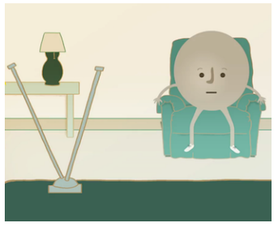


Welcome to STAT110x! We hope you enjoy the course, and learn a lot about how to think about randomness and uncertainty. This is an intermediate level course, meant to be challenging so as to build a strong foundation. If you would like a more basic (but less comprehensive) course in probability, you can consider taking Fat Chance instead (or in addition), also offered by HarvardX.

Course Structure

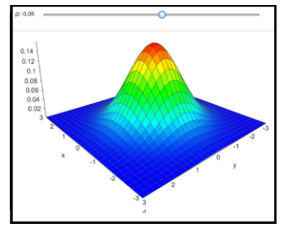
This course has seven units of content, after Unit 0's short introduction and orientation. For each of these seven units, the structure is as follows.

First, we set the stage with an **animation** taking place in the realm of Statland. The animation is meant to build motivation and intuition for some of the most important questions and concepts addressed in the unit.

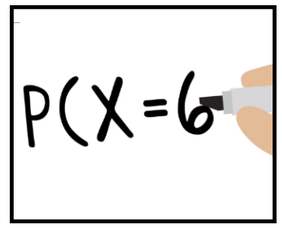


Next, there are **readings** adapted from the book *Introduction to Probability* by Joe Blitzstein and Jessica Hwang. Please read these *actively*, asking (and trying to answer) questions as you go along; see this Quora answer for some advice on how to read mathematical material actively.

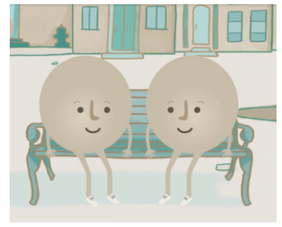
After the reading, there are one or more **interactives**, designed to allow you to experiment with some concepts from the unit, through a visualization or simulation.



Solving problems is essential for learning probability well, so each unit also contains **practice problems and homework problems** (see the syllabus for information about the distinction between these two types of problems).



Asking questions when you are stuck will help you learn. We have included opportunities for you to get help from your peers and the course team in the **discussion** forums. Additional forums are provided to introduce yourself to your peers and discuss related content or ideas about probability for those who want to explore further and make connections to current events or other related content.



To ensure a fair learning environment for everyone, be sure to review and follow the honor code and discussion forum guidelines in the syllabus when posting.

Prerequisites

All units of this course require knowledge of algebra; Units 4-6 require single variable calculus (derivatives and integrals); Unit 7 requires familiarity with matrices. No previous background in probability or statistics is required.

Description

An introduction to probability, as a language and set of tools for understanding statistics, science, risk, and randomness. Basics: sample spaces and events, conditional probability, and Bayes' theorem. Univariate distributions: density functions, expectation and variance, Bernoulli, Binomial, Hypergeometric, Geometric, Negative Binomial, Poisson, Uniform, Normal, Exponential, and Cauchy distributions. Multivariate

distributions: joint and conditional distributions, Multinomial, Multivariate Normal. Limit laws: law of large numbers, central limit theorem. Markov chains: transition probabilities, stationary distributions, convergence.

Shorter Description

The world is replete with randomness and uncertainty; probability and statistics extend logic into this realm. We will systematically introduce the ideas and tools of probability, which are useful in statistics, science, philosophy, engineering, economics, finance, and everyday life. Both the mathematical results of the subject and applications to solving problems will be studied.

Even Shorter Description

How to understand and work with randomness and uncertainty through probability models, random variables and their distributions, and thinking conditionally.