MATH B104: PROBABILITY AND STATISTICS

There are no prerequisites for Math 104.

In a five-card poker hand what are the chances of getting different combinations of cards, such as getting all red cards or getting exactly three hearts? In this course you will learn how to calculate such chances and other similar ones. You will be surprised to discover from your work that some seemingly unlikely outcomes are more likely than you might think, while other outcomes that might seem likely actually have very little chance of occurring.

If you have two related sets of data, such as the heights and weights of a large group of people, you will learn how you can accurately estimate the weight of one of these people from the person's height, or estimate the height from the weight, just by knowing a few summary statistics about the whole group, such as the average height and average weight of the all the people.

Before elections we always hear polls about how voters are going to vote. How are these polls done accurately, and with such high confidence, by the pollsters? They are done by taking random samples of voters. We will learn how a sample can by drawn from a population, such as the population of voters, so that the sample will accurately reflect the population from which it is taken. We will learn the non-intuitive result that the sample can be very small and still produce very accurate results, provided the sample is taken in the right way. Then we will learn about how estimates and predictions about the voters can be made from the sample and how we can measure the accuracy of those results so that we can have high confidence in them.

The effectiveness of a new drug in treating a health condition is to be studied. How can the effectiveness of the drug be evaluated? How can we help prevent possible biases or confounding factors from affecting this evaluation? We will learn how this can be done and how the effectiveness can be mathematically evaluated by using what are called Tests of Significance, such as the z-test or the t-test.

These and other related topics will be studied in this course at an introductory level using only mathematical techniques with which you are familiar from earlier mathematics courses. The course will be done in "hybrid" format, so that you will be able to attend the course remotely on ZOOM.