Chapter 1

What is Statistics?

Definition: Statistics is the science of presenting and interpreting data.

Descriptive Stats

- collecting,
- describing,
- etc.

Inferential Stats

- interpreting,
- modeling,
- Making decisions.

FN211 lies entirely in the subset of inferential statistics (sometimes called Mathematical Statistics)

Two stages in the mind of a statistician.

1. Design of an experiment and subsequent investigation.
2. Forming a statistical model and inference.

Definition: Statistics provides the model that are needed to study situations involving uncertainties.

A paramount issue is formulating appropriate and valid models depending, of course, on the proposed experiment.

Some questions and ideas we will pose and answer:

Q1: What is the probability of an event?

Q2: What is a probability model?

Q3: Discrete random variables VS Continuous random variables?

Q4: Counting and the principle of choices?

etc…

Casually speaking, the term probability is a measure of one's belief in the occurrence of a future event.

In your first course in Statistics, you probably began the course by discussing data:

1. Histograms, pie charts,
2. Measurements of center (mean, median),
3. Measurements of dispersion (variance, quartiles).

Then stepped back and discussed Probability, etc.

For example, you most likely encountered the famous discrete distribution : Binomial distribution.

$$P(X=k)=\binom{n}{k}p^{k}(1-p)^{n-k} \quad ;x=0,1,2,...,n$$

In addition, you also discussed the normal distribution

$$f(x)=\frac{1}{\sqrt{2\pi}\sigma}e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^{2}} \quad ,-\infty<x<\infty$$

Then onto Sampling distribution, CI, Hypothesis testing,…

In this course, FN211, we are going to concentrate on the middle part,

Discrete/Continuous Probability Distribution.