

Robert Davidson  
**ST1112: Statistics**

70% Exam  
30% Continuous Assessment (3 parts)

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# 1 Inferential Statistics

The ultimate goal in statistical inference is to estimate population parameters (like the mean  $\mu$ ) based on sample statistics (like the sample mean  $\bar{X}$ ).

## 1.1 Probability vs Statistics

- **Probability** deals with known underlying processes: one starts with a model (like proportion of red vs. green jelly beans in a jar) and computes probability of specific outcomes
- **Statistics** works in reverse: one observes outcomes (sample data) and attempts to infer the underlying process or population parameters (e.g. proportion of red jellybeans)

## 1.2 Definitions and Concepts

### Definition 1.1: Population

A **population** is the complete set of items (or individuals) of interest.

### Definition 1.2: Sample

A **sample** is a subset of that population, intended to represent the population

### Concept 1.1: Sampling Variation

When we take multiple samples from the same population, each sample's mean  $\bar{X}$  will be different. This variability is called **sampling variation**.

Larger sample sizes tend to reduce this variation, that is as  $n$  grows, the sample mean  $\bar{X}$  becomes a better estimate of the population mean  $\mu$ .