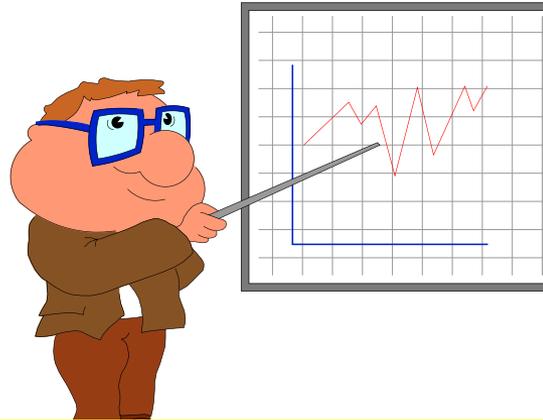TAIBAH UNIVERSITY

Faculty of Science

Department of Math.

جامعة طيبة
كلية العلوم
قسم الرياضيات

Probability and Statistics for Engineers

STAT 301

Teacher :

Lesson 1

Introduction

Definition:

- **Statistics**:

A collection of methods for planning experiments, obtaining data, and then organizing, summarizing, presenting, analyzing, interpreting, and drawing conclusions based on the data.

The field of statistics divided into two parts:

1. Descriptive statistics:

Describe data that have been collected. Commonly used descriptive statistics include frequency counts, ranges (high and low scores or values), means, modes, median scores, and standard deviations.

2. Inferential Statistics :

Generalizing from samples to populations using probabilities. Performing hypothesis testing, determining relationships between variables, and making predictions.

Inferential Statistics :

Estimation

Test of Hypotheses

Point Estimation

Interval Estimation

Definitions:

- **Data**:

  Are observations (such as measurements, genders, survey responses) that have been collected.

  - **Variable**:

    Is a characteristic or attribute that takes different values in different person.

- **Random Variable**: A variable whose values are determined by chance

- **Population**:

  Is the complete collection of all elements (scores, people, measurements, and so on) to be studied

- **Sample**:

  A subgroup or subset of the population.

- **Parameter**: **Characteristic or measure obtained from a population.**

- **Statistic**: **Characteristic or measure obtained from a sample.**

Population

Probability

Descriptive
Statistics

Sample

Inferential Statistics
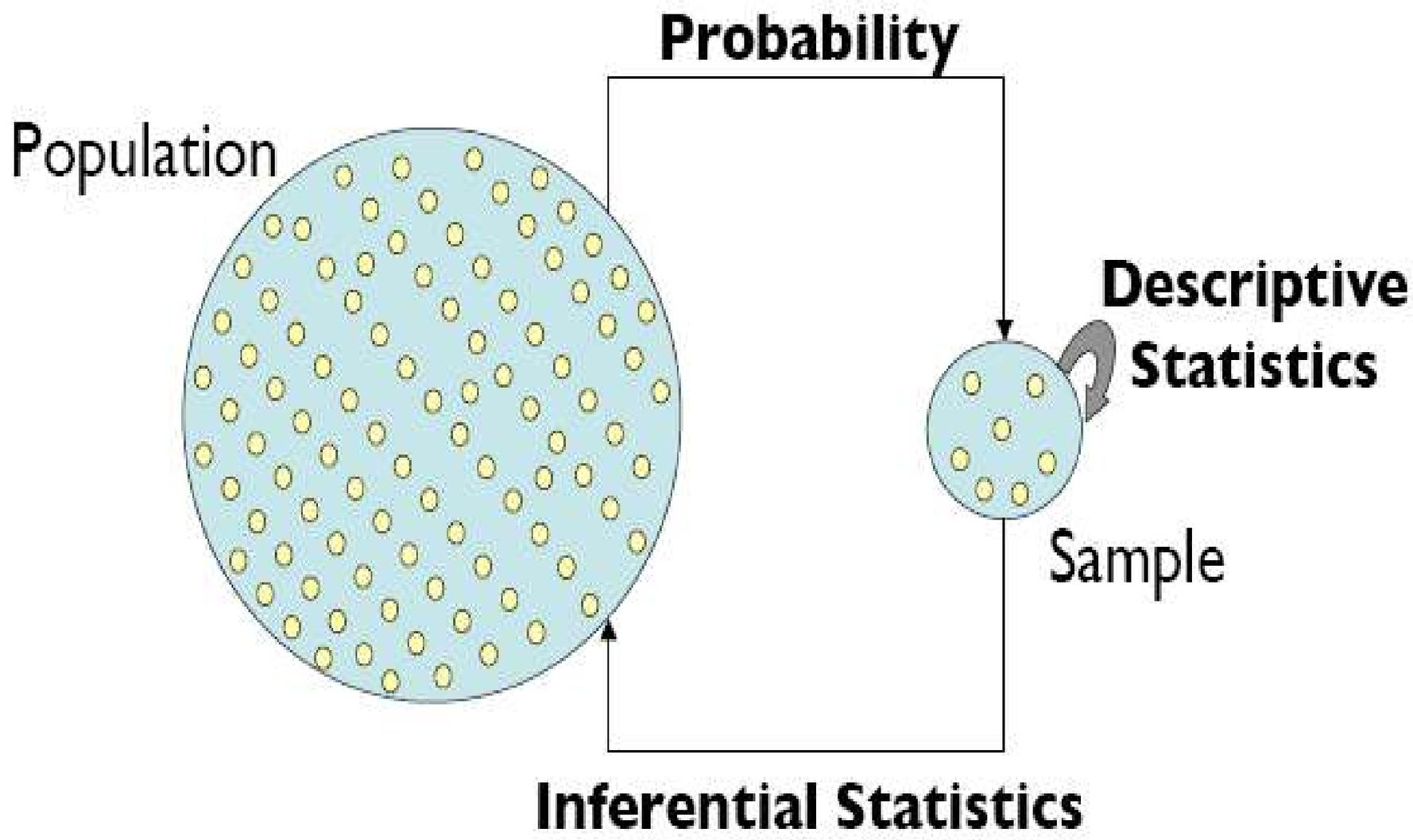
Table below explains some parameters and statistics

Measure	Parameter	Statistic
Size	N	n
Mean	μ	$\bar{x}$
Variance	σ^2	S^2
Standard Deviation	σ	S

Populations and Samples:

Population
(Some Unknown Parameters)

Example: TU

Students (Height

Mean)

N=Population Size

Sample = Observations

(We calculate Some

Statistics)

Example: 20 Students

from TU (Sample Mean)

n = Sample Size

Let $x_1, x_2, \ldots, x_N$ be the population values (in general, they are unknown)

Let $x_1, x_2, \ldots, x_n$ be the sample values (these values are known)

Statistic obtained from the sample are used to estimate (approximate) the parameters of the population.