**Chapter 1: The Role of Statistics in Engineering**

**Statistics** is the science of **collecting**, **organizing**, **analyzing**, and **interpreting** **DATA** to **make decisions**.

**Descriptive Statistics**: Involves **organizing**, **summarizing**, and **displaying** data.

**Inferential Statistics**: Involves using sample data to **draw conclusions** about a population.

**Statistical concept**

**Population**: the complete collection of **all individuals** to **be studied**.

population: parking times of all students

**Sample**: **Sub-collection** of members selected **from a population**.

sample: parking times of 130 students

**Data**: consist of **information** coming from observations, counts, measurements, or responses.

**Parameter**: a **numerical measurement** describing some **characteristics** of a **population**. (population mean, population variance, …)

parameter: average parking times of all students

**Statistic**: a **numerical measurement** describing some **characteristics** of a **sample**. (sample mean, sample variance, sample stdev, test statistic,... )

statistic: average parking times of 130 students

**Type of data**

**Qualitative data (Categorical data) Quality**

**Quantitative data (Numerical data) Quantity**

**Discrete** variables arise from a **counting process.**

(e.g., number of classes you are taking). \*The number of

**Continuous** variables arise from a **measuring process.**

(e.g., your annual salary, or your weight). \*The amount of, …

**Collecting data**

**Retrospective study**: using **historical** data.

**Observational study**: A researcher **observes** and **measures** characteristics of interest of part of a population.

**Designed experiment**: A **treatment** is applied to part of a population and responses are observed.

**Big picture of Statistics**

