Probability and Statistics

INSTRUCTOR:
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Course Text Book

Richard Arnold Johnson, Miller & Freund's **Probability and Statistics for Engineers**, 8-th Edition, Prentice Hall, 2011.

Lecture Notes.

How is my grade determined?

Group Project : 10%

Biweekly Homework Assignments: 5%

Quiz: 5%

Midterm: 10%

Comprehensive Final: 70%

Project **Phase I :**

Team Building Process

Due Date 10th of October

Each teamwork consists of 5-6 students including **"Team Leader"**

Team Members (Name, mobile, email , team name) collected.

A list of projects are sent to all students within first two weeks to select from

WHY Statistics?

To deal with measurements and uncertainties, we need to study how to interpret data collected and to quantify the **data** (average, variation, distribution, etc.) for decision making. Hence, apply some form of statistical **analysis**.

Probability and Statistics I

Three Main Branches :

I.   Descriptive Statistics

II.   Probability Theory

III.   Inferential Statistics

Descriptive Statistics

Organization and Description of Data

- Makes sense of data

- Uses numerical and graphical methods

- Effectively finds important information from the data set in order to make decisions.

Probability

Is used to find the probability (likelihood)of an uncertain event given information about a known population

It assigns a numerical value to this event measuring the degree of uncertainty between 0 to 1

Population → Sample

Inferential Statistics

Is used to draw conclusions about a population given information about a sample drawn from this population.

Use sample data to infer population characteristics

Uses this information in good decision making

Sample → Population

Random Experiment

- ◦ Experimental Measurements suffer from **variations** because of uncontrolled factors ; (temperature, uncertainty , time factor, …)

- ◦ It is a natural phenomenon

- ◦ Even for the same settings of the experiment, the measure output is not exactly the same, we say "not deterministic"   or   " **Random** "

- ◦ We need statistical methods to study randomness; learn which factors mostly affect performance

Data Types

Data may be a **discrete set** of points or may be **continuous** defined in an interval.

There are 4 levels of measurement: Depending on the level of measurement of the variable, what you can do to analyze your data may be limited. There is a hierarchy in the complexity and precision of the level of measurement, from low (nominal) to high (ratio).

Nominal: the data can only be categorized

Ordinal: the data can be categorized and ranked

Interval: the data can be categorized, ranked, and evenly spaced

Ratio: the data can be categorized, ranked, evenly spaced, and has a zero.

Reference

Text book

Chapter 1