

University of Salahaddin  
College of Administration and Economics  
Department of Statistics

# **Subject:MATLAB**

**B.Sc., in Statistics**  
**Second Class -Academic Year**  
**Second Course (2023 – 2024)**

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## **Introduction**

MATLAB is a proprietary multi-paradigm programming language and numerical computing environment developed by MathWorks. MATLAB allows matrix manipulations, plotting of functions and data, implementation of algorithms, creation of user interfaces, and interfacing with programs written in other languages.

. Millions of engineers and scientists worldwide use MATLAB® to analyze and design the systems and products transforming our world. The matrix-based MATLAB language is the world's most natural way to express computational mathematics. Built-in graphics make it easy to visualize and gain insights from data. The desktop environment invites experimentation, exploration, and discovery. These MATLAB tools and capabilities are all rigorously tested and designed to work together.

MATLAB helps you take your ideas beyond the desktop. You can run your analyses on larger data sets, and scale up to clusters and clouds. MATLAB code can be integrated with other languages, enabling you to deploy algorithms and applications within web, enterprise, and production systems.

## **Course objective**

In this course, we start from the very beginning and no prior programming experience is required. The course will introduce the students to the MATLAB software programming for numerical computations, in particular, familiarizing them with the MATLAB Desktop commands through the Command window, and output through the Graph window. This course is intended as a reference book for students, professionals and research workers who need to apply statistical analysis to a large variety of practical problems using MATLAB. The key objective of this course is to deliver a preliminary coverage of the linear algebras and statistical tools including data description, measure of central tendency, statistical distributions, and correlation and regression

## **Forms of teaching**

Several forms of teaching will be used to reach the objectives of the course: power point presentation for the head titles and summary of conclusion with applications by designing a MATLAB code to generating a sequences independent from random variables has many different distributions. Furthermore, students will content homework. There will be classroom discussions and the lecture will give enough background to, solve, analyse, and evaluate problems sets.

## **Grading**

The student is required to do two closed book exam. at the mid of the semester , all the exam. has 25 marks.

**Total of Mid-semester exam. :**

**50% Final Exam:**

**50% [ 25% (Theory) and 25% (Practical) ]**

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<b>Content : First course</b>		
<b>Week</b>	<b>Date</b>	<b>Subject</b>
Lecture-1	<b>2-2024</b>	Chapter One Descriptive statistics Mean
Lecture-2	<b>2-2024</b>	Mode Example
Lecture-3	<b>2-2024</b>	Median Example
Lecture-4	<b>2-2024</b>	Standard deviation Variance Range
Lecture-5	<b>3 - 2024</b>	Inter – quartile Range
Lecture-6	<b>3-2024</b>	Skewness kurtosis
Lecture-7	<b>3-2024</b>	Chapter Two Simple Linear Correlation Matrix and Covariance Matrix
Lecture-8	<b>4-2024</b>	Simple Linear Regression
Lecture-9	<b>4-2024</b>	Mean Square Error 3) Standard Error.
Lecture-10	<b>4-2024</b>	Chapter Three Plot
Lecture-11	<b>4-2024</b>	Subplot
Lecture-12	<b>5-2024</b>	Homework
Lecture-13	<b>5-2024</b>	Plotting Data Making Pretty Pictures 2-D plots Plot several sets of data on the same figure Label for plots e.g. Xlabel, Ylabel, Title, Legend, axis limits

Lecture-14	5-2024	Generating Random Numbers
Lecture-15	5-2024	More on Plotting, e.g. Linewidth, changing fonts, changing colors, grids, subplots, ... etc. Surface and 3D plots, with all options used in 2-D plots.
Examination		Midterm Exam

**Examination**

**Final Exam-First Trail**

Q1\ x = [2 3 2 4 2 5 4 4 5 4 6 8 9 4 7 3 7 6];

Find:

1-Variance

2-Standard deviation

V= var(x)

V= 4.3301

S = std(x)

S= 2.0809

Q2\ H.W1: For the following data:

X	8	10	14	16	17	20	22	26
y	2	3	5	7	8	10	12	15

Find:

- 1)Average of Dependent variable.
- 2)Variance of independent variable.
- 3)Standard deviation of the Dependent variable.
- 4)Simple Linear correlation.
- 5)The Coefficient of Determination.
- 6)Covariance between the Dependent variable(y) & independent variable(x).

SOL:

$x=[8\ 10\ 14\ 16\ 17\ 20\ 22\ 26];$

$y=[2\ 3\ 5\ 7\ 8\ 10\ 12\ 15];$

1)  $My=\text{mean}(y)$

2)  $Vx=\text{var}(x)$

3)  $Sy=\text{std}(y)$

4)  $q=[x'\ y'];$

$r = \text{corr}(q)$

5)  $R^2 = r.^2$

6) Covariance =  $\text{cov}(x,y)$

$My = 7.7500$

$Vx = 36.2679$

$Sy = 4.4641$

$r = 0.9950$

$R = 0.9900$

Covariance =

$36.2679\ 26.7500$

$26.7500\ 19.9286$