Department of: Statistics

College of: Administration and Economics.

University of: Salahaddin.

Subject: Matrices.

Course Book : *2nd stage*

First Semester

Lecturer's name: Zainab Abdulla Muhammad

Academic Year: 2023 - 2024

Course Book

1. Course name	Matrices
2. Lecturer in charge	Zainab Abdulla Muhammad
3. Department/ College	Department of Administration / College of Administration and Economics.
4. Contact	e-mail: zainab.muhammad@su.edu.krd Tel: (optional)
5. Time (in hours) per week	For example Theory: 9 hours Practical: 0
6. Office hours	3 hours per week
7. Course code	
8. Teacher's academic profile	From 2006 until 2008 worked in Statistics Department - Salahaddin University. In 2011 I had my MSc. In Statistics from same University. From 2011 till now I am working as a Lecturer in Statistics Department- Salahaddin University.
9. Keywords	Elementary of Linear algebra, Definition of Linear algebra, Matrix, Square Matrix, Equal matrix, Zero matrix, Algebraic operations, Addition of matrices, Subtraction of matrices, Multiplication of a matrix by a scalar, Multiplication of two matrices, Type of matrices: Diagonal, ….

10. Course overview:

The general purpose of this course is to study the basic concepts of this course Linear algebra is divided into three parts. The first part deals with liner Algebra (Matrices), the second part deals with Determinant Of a Matrices , and the third part deals with the Linear Equation, Vector …

11. Course objective:

Linear algebra is concerned with finite dimensional vector spaces. Solving systems of linear equations is one of the most important applications of linear algebra. It has been argued that the majority of all mathematical problems encountered in scientific and industrial applications involve solving system at some point. Linear applications arise in such diverse areas as engineering, chemistry, economics, business, ecology, biology and psychology. One of the early goals of this course is to develop algorithm that helps solve larger systems in an orderly manner.

12. Student's obligation

the student commitment the lecture times.

- Commitment to the rules of the class.
- Solve the homework of which was given .

13. Forms of teaching

A course with a large proportion of its teaching taking place in lectures will need to have a high level of essential interest to students to keep them engaged . there are a lot of talks about what is good teaching technique in academic circle , they often come out with different forms such as . classical teaching with blackboard. Power point presentations for the head titles and definitions and summary of conclusions , classification of materials and any other illustrations , studnts will be asked to prepare reports on statistical topics and they should participate as mush as possible in lectures discussions . .

14. Assessment scheme

Allocation of degree examinations as follows: -

1) 40 degree of yearly seek (20 per exam)

The first course (15) degree to action examination
(5) degree to activity & conducting quiz.

The second course (15) degree to action examination
(5) degree to activity & conducting quiz.

2) 60 degree final exam (first round or the second)

15. Student learning outcome:

During the study period of BSc , there will be good opportunities for students who had this course to engags in part time works in many companies and organizations as data collectors , data entries , data presenters and analysers . therefore , it is very important to have all the subjects which are pretended to take in this course . in another hand . without taking this course , students could not have good understanding for the subjects of the next years.

Students will have good knowledge about the philosophy of statistics and how to merge between statistical methods and real life . in other words , students can do something with any data that they receive it

16. Course Reading List and References:

1. Strang, G., 1980, Linear algebra and it is application, 2nd edition, Academic Press, New York.
2. S.J. Leon, Linear algebra with applications, Prentice Hall, 6th Edition, 2002.
3. G.H.Golub and C.F.Vantamn. Matrix and application, John Hopkins Univ. Press, 3rd Ed. Baltimore, 1996.
4. Larson R., C. Falvo D.C. Elementary Linear algebra 6th Edition, Houghton Mifflin Harcourt Publishing Company, New York,2009.

٥. ايزو, الدكتور فرانك ,ترجمة(نخبة من الاساتذة المتخصصين), ملخصات شوم نظريات ومسائل في المصفوفات ,1962.

٦. الناصر، عبد المجيد حمزة ، جواد، لميعة باقر، الجبر الخطي، تموز 1988.

17. The Topics:

Lecturer's name:

Zainab Abdulla

three hours a week

ex: 17/9/2023

	Subject
First week	• Introduction in Linear algebra • Definitions: ➢ Matrix ➢ Square Matrix ➢ Equal matrix
Second week	➢ Equal matrix ➢ Zero matrix

Third week	➢ Algebraic operations ➢ Addition of matrices		
Fourth week	➢ Subtraction of matrices		
Fifth week	➢ Multiplication of a matrix by a scalar ➢ Multiplication of two matrices		
Sixth week	➢ Type of matrices: Diagonal matrix ➢		
Seventh week	➢ Upper triangular matrix ➢ Lower triangular matrix		
Eighth week	➢ Scalar matrix		
Ninth week	➢ Identity matrix ➢ Anti – commute matrix		
Tenth week	➢ Idempotent matrix		
Eleventh week	➢ Nilpotent matrix		
Twelfth week	➢ Involutary matrix ➢ Trace of matrix		
Thirteenth week	Exam 1 in (40 Dgree)		

18. Practical Topics (If there is any)

In this section The lecturer shall write titles of all practical topics he/she is going to give during the term. This also includeS a brief description of the objectives of each topic, date and time of the lecture .

19. Examinations:

Q_1\\ Define:

- Matrix: An (m×n)real (complex) matrix A is an array of real (complex) numbers a_{ij} $(1 \le i \le m\ ,\ 1 \le j \le n)$ arranged in (m) rows and (n) columns.
- Zero matrix: A is matrix if all elements are zero then A is called zero matrix. We denote such a matrix by ($0_{m\times n}$) or simply by($\underline{0}$) . If there can be confusion about its size.
- Multiplication of two matrices: Let $A=(a_{ij})$ for size (m×n) and $B=(b_{ij})$ for size (n×p), then A.B is defined if and only if (n=n).

$$A_{m\times n} \cdot B_{n\times p} = C_{m\times p}$$

- Upper triangular matrix: A square matrix $A=[a_{ij}]_{n\times n}$ echelon form is upper triangular (that is, $a_{ij}=0$ if i >j) or ($a_{ij}\neq 0$ if i <j), or if all element under diagonal are zero.
- Anti – commute matrix: We called for A , B matrix Anti – commute matrix if (A.B = -B.A)

Q2\\ Let $A=\begin{bmatrix} 2 & 3 \\ -1 & 4 \\ 7 & 0 \end{bmatrix}$ and k=3, then find k.A?

Solution:

$$k.A = 3\begin{bmatrix} 2 & 3 \\ -1 & 4 \\ 7 & 0 \end{bmatrix} = \begin{bmatrix} 3(2) & 3(3) \\ 3(-1) & 3(4) \\ 3(7) & 3(0\_ \end{bmatrix} = \begin{bmatrix} 6 & 9 \\ -3 & 12 \\ 21 & 0 \end{bmatrix}$$

Q3\\ Find the trace for matrix B if $B=\begin{bmatrix} 1 & 3 & 2 \\ 2 & -1 & 0 \\ 0 & 4 & 6 \end{bmatrix}$

Solution:

$$tr(B)= \sum_{i=1}^{n} a_{ii} = \sum_{i=1}^{3} a_{ii} = a_{11} + a_{22} + a_{33}$$

= 1+(-1) + 6 = 6

20. Extra notes:

21. Peer review پێداچوونەوەی هاوەڵ