

Ministry of Higher Education and Scientific research



**Department of Med.&Comm.-Physics**

**College of *Science***

**University of *Salahaddin-Erbil***

**Subject: *Linear Algebra I***

**Course Book (*Second Year/Second Semester*)**

**Lecturer's name *Awreng Baiz Mahmood***

**Academic Year *2022-2023***

# Course Book

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| <b>1. Course name</b>                | Linear Algebra I   |
| <b>2. Lecturer in charge</b>         | Awreng B. Mahmood  |
| <b>3. Department/ College</b>        | Medical& Communication -physics / Science  |
| <b>4. Contact</b>                    | E-mail: awreng.@su.edu.krd<br>Tel: (optional)  |
| <b>5. Time (in hours) per week</b>   | Theory: 2<br>Practical: 1  |
| <b>6. Office hours</b>               | Tuesday, Wednesday and Thursday at:<br>(08:30am–10:30am) and (12:30pm–01:30pm)   |
| <b>7. Course code</b>                |  |
| <b>8. Teacher's academic profile</b> | My name is Awreng B. Mahmood. I graduated from mathematics Department in Mosul University/ Iraq. I have got Master of Science in commutative Algebra, Since 2006 in college of science / Salahaddin University. Recently I got PHD of science in Number theory/2018 from University of Mosul/ College of Computer sciences and Mathematics/Mathematics Department. I am working as a lecturer in mathematics department / college of science / Salahaddin University-Erbil up to date.   |
| <b>9. Keywords</b>                   | Matrix, linear system equation and inverse,...   |
| <b>10. Course overview:</b>          | <p><b>Linear Algebra</b> is one of the most important basic areas in Mathematics, having at least as great an impact as Calculus, and indeed it provides a significant part of the machinery required to generalize Calculus to vector-valued functions of many variables. Unlike many algebraic systems studied in Mathematics or applied within or out with it, many of the problems studied in Linear Algebra are amenable to systematic and even algorithmic solutions, and this makes them implementable on computers { this explains why so much calculational use of computers involves this kind of algebra and why it is so widely used. Many geometric topics are studied making use of concepts from Linear Algebra, and the idea of a linear transformation is an algebraic version of geometric transformation. Finally, much of modern abstract algebra builds on Linear Algebra and often provides concrete examples of general ideas. Some of the topics that this book addresses are: linear equations, Matrix, determinants, vector spaces, subspaces, eigenvalues and eigenvectors.</p> |
| <b>11. Course objective:</b>         | The interplay between mathematics and physics needs no emphasis. What may need to be emphasized is that mathematics is not merely a tool with which the presentation of physics is facilitated, but the only medium in which physics can survive. Just as language is the means  |

by which humans can express their thoughts and without which they lose their unique identity, mathematics is the only language through which physics can express itself and without which it loses its identity.

Problems in linear algebra arise in a wide variety of scientific and engineering applications including the design of structures, the analysis of electrical networks, and the modeling of chemical processes. This course will cover the analysis and implementation of algorithms used to solve linear algebra problems in practice. This course will enable students to acquire further skills in the techniques of linear algebra, as well as understanding of the principles underlying the subject. This course will prepare students for further courses in mathematics and/or related disciplines (e.g. engineering, economics, actuarial science, etc.). At the end of this course, and having completed the Essential reading and activities, students should have used the concepts, terminology, methods and conventions covered in this course to solve the mathematical problems in this subject. Student will also develop the ability to demonstrate an understanding of the underlying principles of the subject and the ability to solve unseen mathematical problems involving an understanding of the concepts and applications of these methods.

#### **12. Student's obligation**

Students and their obligations throughout the academic year, is the attendance and completion of all tests, exams, assignments.

#### **13. Forms of teaching**

Magic board and discussion and allow leg students to write some problems on the board and assignments and I give hard copy of my lecture notes to students before coming lecturer time.

#### **14. Assessment scheme**

The students are required to do two closed book exams during of the study year. The exam has 40 marks. There will be a final exam on 60 marks.

#### **15. Student learning outcome:**

On successful completion of the course, the students should be able to:

- give basic definitions;
- verify that standard examples satisfy these definitions;
- use standard methods to find bases of subspaces;
- Solving linear system;
- find real eigenvalues and eigenvectors of real matrices;
- diagonalize of real symmetric matrices with rational eigenvalues.

#### **16. Course Reading List and References:**

- [1] Dubey, B. (2007), introductory linear algebra, Asian Book Private Limited, Darya Ganj, New Delhi-110002.

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| <ul style="list-style-type: none"> <li>• [2] Kolman B. (1995), introductory linear algebra with applications, 2<sup>nd</sup> edition, Prentice-Hall, Inc.</li> <li>• Anton, H. and Rorres, C. (1994), Elementary linear Algebra, application version, 7<sup>th</sup> edition, John Wiley and Sons, INC.</li> <li>• LIPSCHUTZ, S. (2004), Schaum's outline of theory and problems of linear algebra, 3<sup>rd</sup> edition, SCHAUM'S OUTLINE SERIES , McGRAW-HILL.</li> <li>• Any other books about Linear Algebra.</li> </ul> |                        |
| <b>17. The Topics:</b>   | <b>Lecturer's name</b> |
| <b>Chapter 1: Linear systems</b> <ul style="list-style-type: none"> <li>• Solution of Linear systems</li> <li>• Matrices</li> <li>• The Inverse of matrix</li> <li>• Determinants</li> </ul>   |                        |
| <b>18. Practical Topics (If there is any)</b>  |                        |
| <b>19. Examinations:</b><br>Compositional: In this type of exam the questions usually starts with Explain how, furthermore it is like as lecture notes and contains some homework , so there will be continuing assignments of problem outside the lecture notes (note that this problem having small marks).  |                        |
| <b>20. Extra notes:</b>  |                        |
| <b>21. Peer review</b>   | پیداچونہوہی ھاوہل      |