# Department of Mathematics

# College of Education

# University of Salahaddin

# Subject: Finite Mathematics

# Course Book – (First Year)

# Lecturer's name: Bushra Najmaddin Abdul-Gaphur

# Academic Year: 2023-2024

# Course Book

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| **1. Course name** | **Finite Mathematics** |
| **2. Lecturer in charge** | **Bushra N. Abdul-Ghafur** |
| **3. Department/ College** | **Mathematics/Education** |
| **4. Contact** | **e-gmail:bushra.abdulgaphur@su.edu.krd**<br>**Tel: 07504973726** |
| **5. Time (in hours) per week** | **Theory: 3** |
| **6. Office hours** | |
| **7. Course code** | |
| **8. Teacher's academic profile** | **BSc. 2004, College of Education, University of Salahaddin**<br>**MSc. 2011, College of Education, University of Salahaddin** |
| **9. Keywords** | **, Complex Numbers, Matrices, Operations on Matrices, Determinates, Inverses of Matrix Linear Systems, , Mathematical Induction, Permutations and Combinations.** |

**10. Course overview:**

Finite mathematics (a summary of main concepts and topics in mathematics) plays an increasing role in the applied sciences as well as in mathematics itself. Consequently, it becomes more and more desirable to introduce the student to the field at an early stage of study. This course is intended to familiarize the student with the basic concepts, axioms, principles and methods of finite mathematics and its applications.

This course is an introductory course that covers the foundations of finite mathematics in the context of mathematical induction, matrices and operations on matrices. It is designed for students in Mathematics to introduce them to the basic knowledge of mathematics. It may, however, be useful to students in other related fields. In addition to these specific topics, an important goal of the course is to acquire more familiarity with abstract mathematical reasoning and proofs in general, as a transition to more advanced mathematical courses.

The focus of this course is on the study of complex numbers, operations on matrices, determinates, linear systems, eigenvalues, eigenvectors, and the most important basic properties. In particular, the solution of the equations of degree three and equations of degree four, permutations and combinations will be covered.

**11. Course objective:**

The general object of this course is to continue providing a deeper understanding and working knowledge of mathematics. This course introduces students to the basic knowledge and main concepts infinite mathematics. In addition, important goals of the course are:

1) introduce students to the mathematical induction as a proof technique that

allows us to prove some mathematical statements;
2) survey the algebraic and geometric structure of the complex numbers system;
3) introduce students to the field of matrices and operations on matrices;
4) finding determinant and the inverse of a square matrix (if exist);
5) survey the linear systems and solution of them;
6) finding eigen values and eigen vectors of square matrices.

**12. Student's obligation**

1- Attendance.
2- Quiz.
3- There examinations will be given, each 40%.
4- Final exam 60%.

## 13. Forms of teaching

1-Data show
2- Whiteboard

## 14. Assessment scheme

1- 5% from quiz after each section.

2- 5% from example classes.

3- 30% from midterm test.

4- 60% from final Examination.

## 15. Student learning outcome:

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

1) prove some mathematical statements using mathematical induction as a proof technique in mathematics;
2) solve the algebraic and geometric problems in the complex numbers system;
3) familiar with the field of matrices and operations on matrices;
4) find determinant and the inverse of a square matrix (if exist);
5) solve linear systems using three different methods;
6) find eigen values and eigen vectors of square matrices;
7) give examples and counterexamples illustrating the mathematical concepts presented in the course;
8) identify the essential features in methods and arguments introduced in the course and adapt them to other settings.

| **17. The Topics:** | **Lecturer's name** |
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| Second semester<br><br>***Week 1 and 2*:** Complex numbers, Complex Number Formulas, Conjugate and absolute value of a Complex Numbers, and polar representation of complex numbers, Demoivers Theorem,.<br><br>**Weeks 3, 4, and 5:** Matrices, Operations on Matrices, Some Types of Matrices.<br><br>**Weeks 6, and 7:** Determinates, Properties of Determinants<br><br>**Weeks 8, and 9:** Inverses of Matrices<br><br>**Weeks10, and 11:** Linear Systems, Cramers Rule and, Gausse – Gordan method for solving linear systems<br><br>**Weeks 12 : Eigen values and Eigen vectors**<br><br>**Weeks 13:** Mathematical Inductions | Busha N. Abdul-Gaphur<br>G(A)- (3 hrs)<br>G(B)- (3 hrs) |