University: Cairo **Faculty:** Engineering **Department:** Aerospace Engineering

Course Specifications

Programme on which the course is given: Aerospace Engineering
Major or Minor element of programmes: Major
Department offering the programme : Aerospace Engineering Department
Department offering the course : Engineering Mathematics and Physics
Academic year/level : Second Year (Junior Level)
Date of specification approval : 2015

A- Basic Information

Title : Mathematics (3)
Code : MTH 216B
Specification is not based on credit hour system.
However, equivalent is computed based on:
credit hour = contact hour for lecture,
credit hour = 2 contact hours for tutorial or practical:
Lecture: 3 Hrs./week Tutorial: 1 Hrs./week Practical: 0 Total: 4 Hrs./week
(contact hours per week: Lecture 3, Tutorial 2, Total 5 hours)

B- Professional information

1.Overall Aims of Course

At the end of this course, the student should be able to:

- Understand the algebraic structure of Vector Spaces.
- Solve a System of Linear Equations exactly, iteratively, or approximately.
- Solve the Eigenvalue Problem of a Square Matrix.
- Solve the control problem.

2.Intended Learning Outcomes of Course (ILOs)

a- Knowledge and understanding:

a1- Vector Spaces and Linear Transformations.
a2- The eigenvalue problem and its applications.
a3- Diagonalization of semi-simple matrices.

b- Intellectual Skills:

b1- Identify Linear Transformations and their Matrix Representations..
b2- Solve Linear Systems exactly, iteratively, and approximately with a . . . . simple idea about error analysis .
b3- Solve the Eigenvalue Problem.

3.Contents

Topic	No. of hours	Lecture	Tutorial
Matrix types and operations	8	5	3
Properties of matrix operations	8	5	3
Vector spaces and subspaces	10	6	4
Solution of linear system of equations.	12	8	4
Basis and dimensions	10	6	4
The eigen value problem	10	6	4
Diagonalization of semi-simple matrices.	10	6	6
Matrix functions.	7	3	2
Total	75	45	30

4.Teaching and Learning Methods

4.1- Lectures.

4.2- Tutorial sessions to discuss solutions of pre-distributed sets of problems.

5.Assessment Schedule

Assessment 1	Midterm	9^{th} Week
Assessment 2 :	Quiz	12^{th} Week
Assessment 3 :	Final	15^{th} Weekl

Weighting of Assessments

Quiz	10%
Midterm	20%
Final	66.67%
Attendance	3.33%
Total	100%

6.List of References

6.1 - Course Notes:

Lecturer notes (in English).

6.2- Essential Books (Text Books)

"Mathematics, Second Year for Engineering Students", Department of Engineering Math. & Physics - Faculty of Engineering – Cairo university,.

6.3- Recommended Books

1.Advanced Engineering Maths. by Erwin Kreyszig 8^{th} ed., 2000 . . . Chapters 5-7 and 12-15

2.Elementary Linear Algebra 7^{th} ed. 1994 by Howard Anton (ALG 18)

7. Facilities Required for Teaching and Learning

White board, projector.

Head of Department: Prof. Ayman H. Kassem

Date: March, 2015.