KINGDOOM OF SAUDI ARABIA
Ministry of Education
Al-Imam Mohammad Ibn Saud Islamic University
College of Sciences
Department of Mathematics & Statistics

المملكة العربية السعودية
وزارة التعليم
جامعة الإمام محمد بن سعود الإسلامية
كلية العلوم
قسم الرياضيات والإحصاء

SYLLABUS

Course Code	*Course Num.*	*Course Name*	*Credit Hours*	*Lec.*	*Lab.*	*Tut.*	*Private study*	*Pre-requisites*	*Course Level*	*Teaching Language*
MAT	**226**	**Linear Algebra**	**3**	**2**	**0**	**2**	**5**	**MAT 105**	**2[1]**	**English**

A. Course Description

This course describes the most important ideas, theoretical results, and examples of systems of linear equations, matrices, determinants, linear transformations, eigenvalues and eigenvectors. The course includes the essential fundamentals of these topics. The emphasis is on calculations but some applications are detailed.

B. Course Outcomes

At the end of this course the student will be able to:

- Use matrices concept and methods of linear algebra.
- Be familiar with basics of vector spaces and linear transformations.
- Connect linear algebra to other fields.

C. References:

Required Textbook

Linear Algebra, Gareth Williams, 6th Edition, Jones and Bartlett, 2008.

Other references

- *Linear Algebra, Schaum's Outline,* S. Lipschutz, M. Lipson, McGraw-Hi,ll 3rd Edition, 2000.
- *Linear Algebra with Application,* 5th Edition; W. K. Nicholson, McGraw- Hill, 2006.
- *Linear Algebra with Application,* 4th Edition; O. Bretscher; Pearson Ed. Int., 2009.

[1] *B.Sc. of Engineering.*

D. Topics Outline

1. **Matrices And Gauss Elimination:** Linear Equation and Systems, Matrix Notations and Operations, Method of Elimination, Row and Row Reduced Echelon Form of a Matrix, Definition of The Inverse of a Square Matrix, Inverse of Square Matrix By Gauss Elimination.
2. **Determinants:** Determinants and their Properties, Cofactor Expansions, Cramer's Rule.
3. **Eigenvalues and Eigenvectors:** Eigenvalues and Eigenvectors of a Square Matrix, Characteristic Polynomial of a Square Matrix, Matrix Diagonalization, Applications.
4. **Vector Spaces:** Introduction to Vectors and Matrices, Vectors In R^2 and R^3, Dot Product, Norm, Distance, Orthogonal Vectors, angle Between two Vectors, Vector Spaces, Rank, Nullspace, Linear Independence of Vectors, Spanning Subspace, Basis and Dimension, Orthogonality, Projection, Gram-Schmidt Normalization.
5. **Linear Transformations:** Basic Definitions, The Matrix of a Transform, Coordinates and Change of Basis, Homomorphism and Isomorphism, Diagonalization.
6. **Applications:** Matrices in Engineering, Graphs and Networks, Markov Matrices, Population, Gaussian Elimination in Practice.

E. Office Hours

Office hours give students the opportunity to ask in-depth questions and to explore points of confusion or interest that cannot be fully addressed in class

F. Exams & Grading System

The semi-official dates of the exams for this course are:

- **Midterm 1:** 6th or 7th week.
- **Midterm 2:** 11th or 12th week.
- **Quizzes & Homework:** During the semester.
- **Final Exam:** 16th week.

Your course grade will be based on your semester work as follows:

Midterm 1: 20 %	**Midterm 2:** 20 %	**Final Exam:** 40 %
Quizzes, Homework, Attendance & Participation: 20 %		

The grading distribution:

A^+	A	B^+	B	C^+	C	D^+	D	F
[95, 100]	[90, 95)	[85, 90)	[80, 85)	[75, 80)	[70, 75)	[65, 70)	[60, 65)	[0, 60)

G. Student Attendance/Absence

Only three situations will be considered as possible excused absences:

- Occurrence of a birth or death in the immediate family will be excused. ("Immediate family" is defined by the University as spouse, grandparents, parents, brother, or sister).
- Severe illness in which a student is under the care of a doctor and physically unable to attend class will be excused. Students are not excused for a doctor's appointment. Do not make appointments that conflict with rehearsals. Notes from the University Health Center will be accepted.

Executive Rules for Study Regulations and Exams
goo.gl/ykm7t3