



**Course Descriptor**  
**MATH 242 LINEAR ALGEBRA**

<b>Proposed Academic Year</b>	2021/2022	<b>Last Reviewed Academic Year</b>	2021/2022
<b>Course Code</b>	MATH 242	<b>Course Title</b>	LINEAR ALGEBRA
<b>Credit hours</b>	3	<b>Level of study</b>	Undergraduate
<b>College / Centre</b>	College of Applied and Health Sciences	<b>Department</b>	Basic Sciences
<b>Co-requisites</b>	-	<b>Pre-requisites</b>	MATH 141 Mathematics for teachers

**1. COURSE OUTLINE**

[The course will introduce students with the concept of Algebra of Matrices and Vector Spaces. Students will also be exposed to applications to Solutions of systems of linear equations and geometric transformations will also be studied in the course.

**2. AIMS**

[The course aims to introduce different methods of solving systems of linear equations using Matrices and representation of geometric transformations by means of matrices. Students will also solve problems involving linear equations and linear programming problems using determinants.

**3. LEARNING OUTCOMES, TEACHING, LEARNING and ASSESSMENT METHODS**

<b>Learning Outcomes (Definitive)</b>	<b>Teaching and Learning methods (Indicative)</b>	<b>Assessment (Indicative)</b>
Upon successful completion of this course, students will be able to:		
<b>1.</b> Demonstrate an understanding of matrices and their applications in solving problems involving systems of linear equations and linear programming problems.	Electronic Lectures, PowerPoint, and solving problems	Quizzes, Midterm, Assignment, Discussion, Final exam, HomeWorks.
<b>2.</b> Calculate geometric transformations by means of matrices.	Electronic Lectures, PowerPoint, and solving problems	Quizzes, Midterm, Assignment, Discussion, Final exam, HomeWorks .
<b>3.</b> To understand the concepts of vector spaces and their applications, Orthogonal Subspaces and Orthonormal Sets.	Electronic Lectures, PowerPoint, and solving problems	Quizzes, Midterm, Assignment, Discussion, Final exam, HomeWorks .
<b>4.</b> Express the volume of certain figures and equation of line using determinants.	Electronic Lectures, PowerPoint, and solving problems	Quizzes, Midterm, Assignment, Discussion, Final exam, HomeWorks .



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**4. ASSESSMENT WEIGHTING**

Assessment	Percentage of final mark (%)
Quizzes	20 %
Mid term Exam	20 %
Assignment/ HomeWorks	10 %
Participation / Questions	10 %
Final Exam	40 %
<b>TOTAL</b>	<b>100%</b>

**5. ACHIEVING A PASS**

Students will achieve **3** credit hours for this course by passing **ALL** of the course assessments and achieving a **minimum overall score of 50%**.

***NB \*Ensure that ALL learning outcomes are taken into account***

**6. COURSE CONTENT (Indicative)**

**CHAP1: Matrices & System of Equations**

- 1.1 Systems of Linear Equations.
- 1.2 Row Echelon Form.
- 1.3 Matrix Arithmetic.
- 1.4 Matrix Algebra.
- 1.5 Elementary Matrices.

**CHAP2: Determinants.**

- 2.1 The Determinant of a Matrix.
- 2.2 Properties of Determinant.
- 2.3 Additional Topics & Applications.

**CHAP3: Applications of Matrices and Determinants**

- 3.1 Equations of lines using determinants.
- 3.2 Area of triangle using determinants
- 3.3 Determinant and Volumes

**CHAP4: Vector Spaces**

- 4.1 Definition and Examples.
- 4.2 Subspaces.
- 4.3 Linear Independence.
- 4.4 Basis & Dimension.
- 4.5 Change of Basis.
- 4.6 Row Space & Column Space.

**CHAP5: Linear Transformations**

- 5.1 Definition and Examples.
- 5.2 Matrix Representation of Linear Transformations.
- 5.3 Similarity.



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<b>CHAP6: Orthogonality</b>	
6.1 The Scalar Product in $\mathbb{R}^n$ .	
6.2 Orthogonal Subspaces.	
6.3 Least Square Problems.	
6.4 Inner Product Spaces.	
6.5 Orthonormal Sets.	
<b>TOTAL HOURS:</b>	<b>40</b>
<b>RECOMMENDED INDEPENDENT STUDY HOURS:</b>	<b>15</b>
<b>TOTAL COURSE HOURS:</b>	<b>55</b>

**7. RECOMMENDED REFERENCES**

**Core texts:**

1. Linear Algebra with Applications 8th edition, Prentice Hall, New Jersey 2013
2. Linear Algebra with Applications 8<sup>th</sup> edition, Steven J. Leon, Prentice Hall, New Jersey 2013. ISBN 978-0-13-600929-0.

1. Elementary Linear Algebra/ Application Version, 11<sup>th</sup> edition, Howard Anton and CHRIS Rorres, Wiley 2014. ISBN 978-1-118-938881.
2. <https://www.math.ucdavis.edu/~linear/linear-guest.pdf>
3. <https://personal.math.ubc.ca/~carrell/NB.pdf>
4. [http://www.astronomia.edu.uy/progs/algebra/Linear\\_Algebra\\_4th\\_Edition\\_\(2009\)Lipschutz-Lipson.pdf](http://www.astronomia.edu.uy/progs/algebra/Linear_Algebra_4th_Edition_(2009)Lipschutz-Lipson.pdf)