



Course Descriptor
Linear Algebra MATH215

Proposed Academic Year	2021-2022 (FALL)	Last Reviewed Academic Year	-
Course Code	MATH215	Course Title	Linear Algebra
Credit hours	3	Level of study	Undergraduate
College / Centre	College of Applied and Health Sciences	Department	Basic Sciences
Co-requisites	--	Pre-requisites	CALCULUS I+ CALCULUS II

1. COURSE OUTLINE

Algebra of Matrices and Vector Spaces and applications to Solutions of systems of linear equations and geometric Transformations are studied in this course.

2. AIMS

To introduce different methods of solving systems of linear equations Using Matrices and representation of geometric transformations by means of matrices.

3. LEARNING OUTCOMES, TEACHING, LEARNING and ASSESSMENT METHODS

Learning Outcomes	Teaching and Learning methods	Assessment
Upon successful completion of this course, students will be able to:		
1. To be familiar with the ideas of matrices and their applications in solving problems involving systems of linear equations and linear programming problem.	Online Lecture/ electronic board/ discussion/ presentations.	<i>Mid-term Quizzes Final exam Assignment Homework Participation</i>
2. To be able to represent geometric transformations by means of matrices	Online Lecture/ electronic board/ discussion/ presentations.	<i>Mid-term Quizzes Final exam Assignment Homework Participation</i>
3. To evaluate the determinants of matrices and their applications in solving systems of linear equations.	Online Lecture/ electronic board/ discussion/ presentations.	<i>Mid-term Quizzes Final exam Assignment Participation</i>
4. To understand the concepts of vector spaces, Eigenvalues and Eigenvectors.	Online Lecture/ electronic board/ discussion/ presentations.	<i>Quiz Final exam Participation</i>



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4. ASSESSMENT WEIGHTING

Assessment	Percentage of final mark (%)
Mid-term Examination	20
Assignment	10
Participation and Homework	10
Quizzes	20
Final Examination	40
TOTAL	100%

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%**.

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: Vector Spaces

- 3.1 Definition and Examples.
- 3.2 Subspaces.
- 3.3 Linear Independence.
- 3.4 Basis & Dimension.
- 3.5 Change of Basis.
- 3.6 Row Space & Column Space.

CHAP4: Linear Transformations

- 4.1 Definition and Examples.
- 4.2 Matrix Representation of Linear Transformations.
- 4.3 Similarity.

CHAP5: Eigenvalues and Eigenvectors

- 5.1 Eigenvalues and Eigenvectors
- 5.2 Systems of Linear Differential Equations.



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CHAP6: Orthogonality	
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.	
TOTAL HOURS:	40
RECOMMENDED INDEPENDENT STUDY HOURS:	15
TOTAL COURSE HOURS:	55

7. RECOMMENDED REFERENCES

Core texts:

1. Core text/s: Linear Algebra with Applications 8th edition, Steven J. Leon, Prentice Hall, New Jersey 2013. ISBN 978-0-13-600929-0.
2. Elementary Linear Algebra/ Application Version, 11th edition, Howard Anton and CHRIS Rorres, Wiley 2014. ISBN 978-1-118-938881.
3. <https://joshua.smcvt.edu/linearalgebra/book.pdf>