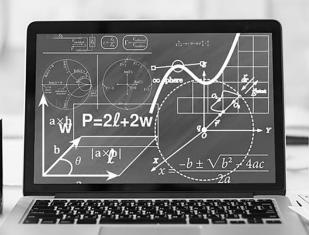


# Linear Algebra Course

Course description

Information
Technology
Engineering





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#### 1. Basic Information:

Course Name	Linear Algebra
Course ID	BLA401
No. of Recorded Sessions*	10 – 12
No. of Synchronized Sessions*	10 – 12
No. of Quizzes (hrs.)	_
Exam (hrs.)	2
Registered Sessions Work Load (hrs.)	36
Synchronized Sessions Work Load (hrs.)	36
Credit Hours	5

<sup>\*</sup> The duration of each session 1.5 hr

#### 2. Pre-Requisites:

Course	ID	
Mathematical Analysis I	BMA401	

### 3. Course Objectives:

This course exposes main concepts of linear algebra. Topics include: vector spaces, matrix algebra, determinants and its applications, dot product and orthogonality, eigen vectors and eigen values.

This course prepares students to apply the basics of linear algebra in their domains of specialties: find the base of a vector space and calculate its dimension, apply matrix operations, find the matrix of a linear application, calculate determinant, study matrices and orthogonal sets, find eigen vectors and its corresponding values, diagonalize matrix and decompose matrix as a product of two matrices.

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# 4. Learning Outcomes (LO):

After successfully completing the course, students should be able to:

- Understand the vector spaces and its bases and dimension.
- Understand the matrices and master its operations.
- Find determinant value.
- Study dot product and orthogonality (matrices and sets).
- Understand and find eigen vectors and values.
- Apply matrix diagonalization.

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# 5. Assessment Results:

			Assessment Type				
Chapter Chapter No. Title		Intended Objectives	Developed content/ Recorded Sessions	Practical Activities (Synchronized Sessions)	Quizzes and Exams	Presentations And Interviews	Reports
CH1  Vector spaces  CH2  Matrix algebra		Understand the vector spaces and its bases and dimension.	X	X	X		X
		Understand the matrices and master its operations.	X	X	X		X
CH3	Determinan ts and its application s	Find determinant value	X	X	X		X
CH4	Dot product and orthogonali	Study dot product and orthogonality	X	X	X		X
CH5	Eigen	Understand and	Х	X	Х		Х

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vectors	find eigen			
and eigen	vectors and			
values	values			

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# 6. Course Syllabus

Chapter No.	Chapter Title	Chapter Content (Syllabus)	No. of Theoretic al Learning Units	No. of Practical Learning Units)
CH1	Vector spaces	<ol> <li>Vector space</li> <li>Sub vector space</li> <li>Base and dimension</li> <li>Direct sum and complement spaces</li> <li>Linear application</li> <li>Linear application rank</li> </ol>	3	3
CH2	Matrix algebra	<ol> <li>Matrix operations</li> <li>Square matrices</li> <li>Special matrices</li> <li>Linear application matrix</li> <li>Matrix rank</li> <li>Change bases</li> <li>Similar matrices</li> </ol>	2	2
СНЗ	Determinants and its applications	<ul><li>8. Permutation signature</li><li>9. Determinant properties</li><li>10. Determinant value</li><li>11. Determinant application</li></ul>	2	2
CH4	Dot product and	<ol> <li>Dot product and its properties</li> <li>Norm</li> </ol>	2	2

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	orthogonality	3. Normalized vector space		
		4. Orthogonal sets and matrices		
		1. Constant space		
CH5	Eigen vectors and eigen values	<ul><li>2. Eigen vectors and values</li><li>3. Special polynomial</li><li>4. Matrix eigen values and its properties</li></ul>	3	3
		<ul><li>5. Eigen spaces</li></ul>		

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# 7. Practical Activity:

Tools and Labs:

Tool Name	Description

• Practical Activities per Chapters:

Chapter	Practical Activity	Remarks
CH1	<b>Exercises</b>	
	<b>▼</b> Homework	
	□ Webinars	
	□ Project	
	☐ Experiment	
	□ Other	
CH2	<b>▼</b> Exercises	
	<b>▼</b> Homework	
	□ Webinars	
	□ Project	
	☐ Experiment	
	□ Other	

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CH3	<b>▼</b> Exercises
	<b>▼</b> Homework
	□ Webinars
	□ Project
	□ Experiment
	□ Other
CH4	<b>E</b> Exercises
	□ Webinars
	□ Project
	□ Experiment
	□ Other
CH5	<b>▼</b> Exercises
	□ Webinars
	□ Project
	□ Experiment
	□ Other

### 8. References: