



Future Academy Higher Future Institute for Specialized Technological Studies

Course Specification

1- Course information:	
Course Code:	BSC203
Course Title:	Linear Algebra
Year/level	2 nd
Academic Programs	Computer Science Program (B.Sc.)
Contact hours/ week	Theoretical (2 hrs) – Practical/Tutorial (2 hr) - Total (4 hrs)

2- Course aims:

This course aims to provide students with basic concepts of matrix theory and linear algebra, Solving systems of linear equations, vector spaces, linear independence, eigenvalues and eigenvectors, basis and dimension, linear transformations, inner products, orthogonality and projections, and their applications

3- Intended learning outcomes of the course (ILOs):

a- Knowledge and understanding:

On successful completion of this course, the student should be able to:

- al- Define systems of linear equations in n variables and select the appropriate method to solve the system
- a2- State the fundamental operations on matrices and determinent and how to use it in solving any system of equations
- a3- Name and define the defferant methods of solving a linear system of equations.
- a4- State and recognaize the meaning of vector spaces, subsbaces, basies, and dimenssion.
- a5- Identify linear transformation between tow different vector spaces.

b- Intellectual skills:

On completing this course, the student should be able to:

- b1- Formulate the linear transformation between to vector spaces
- b2-Express any n dimension vector in terms of another n dimension vectors
- b3- Construct the appropriate mathematical model for network analysis
- b4- Apply matrix methods to find optimal solutions

c- Professional and practical skills:

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

- c1- Use matrices and vectors in signals and images.
- c2- Use matrices and linear transformations in cryptography.
- c3- Apply linear algebra methods for building 2D and 3D models.

d- General and transferable skills:

On successful completion of this course, the student should be able to:

- d1- Work effectively independently and also teams
- d2- Develop and solve software problems.
- d3- Use internet and electronic library for more practical applications.
- 4- Course contents

Week	Topics/units	Number of hours		ILO's
No.		Lecture Practical		
		hours	hours	
1	Matrix theory	2	2	a1, a2
2	Solving system of linear equations	4	4	a1, a2, a3. d1, d2
3	using Gaussian elimination			
	methoud and the inverse of matrix			
4	using elementary operations to	2	2	a1, c1
	evalute the determinant of a			
	matrix+ Quiz1			
5	Applications of system of linear	2	2	a4, b3, c1, c2
	equations (Polynomial Curve			
	Fitting, Network analysis)			
6	Vectors, Eigenvalues and	2	2	c3, b1, b3
	Eigenvectors			
7	Midterm Exam	2	2	
8	Linear Dependent and Linear	2	2	a4, c3
	Independent			
9	Vector spaces, subspaces of	4	4	a4, b1, c3, d2
10	vector spaces Spanning sets.			
11	basis and dimension+ Quiz2	2	2	b2
12	linear transformations, inner	4	4	a5, b1, b2, c2
13	products, orthogonality and			
	projections			
14	Revision and open discussion	2	2	

5- Teaching and learning methods

Methods]													
	a1	a2	a3	a4	a5	b1	b2	b3	c1	c2	c3	d1	d2	d3
Lectures	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	✓
Practical sections	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Self-learning													✓	~
Assays and reviews	√	√	~	~	~	~	~	~	~	~	~	~	√	~
Discussion groups	√	 ✓ 	~	~	~	~	~	~	~	~	~	✓		

6- Teaching and learning methods for Low-achieving students

- Extra teaching hours for those who need help
- More quizzes to assess their ability for understanding the course
- Encourage the team work for those students with other advanced ones to increase their participation and understanding

7- Student assessment

Assessment method	Time	Grade weight (%)	Week	ILOs
Course Work (Tutorial Exercise and Assignments)	¹∕₂ hour	15	3,5,6,9,10	a1, a2, a3. d1, d2, c3, b1, b3, a5,b2, c2
Quiz 1	¹∕₂ hour	5	Week#4	a1, a2, a3. d1, d2
Mid-term exam	One hour	15	Week#7	a4, b3, c1, c2
Quiz 2	¹∕₂ hour	5	Week#11	a4, b1, c3, d2
Final Written exam	2 hours	60	Week#15 or 16	a1, a2, a3, a4, a5, b1, b3, ,b2,c3,c2,

8-List of references

8.1. Student notebooks:

Lectures pourpoint and pdf files

8.2. Essential textbooks:

Ron Larson; David C. Favlo, elementary linear algebra, sixth edition , Houghton miffin Harcourt publishing company,2009.

8.3. Recommended textbooks:

ERWIN KREYSZIG, Advanced engineering mathematics, 9 th edition, Wily international edition, 2006

8.5. Websites

https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/ https://www.youtube.com/watch?v=J7DzL2_Na80&list=PLE7DDD91010BC51F8&index=2

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