Course Specifications

General Information

Course name	Linear Algebra(2)
Course number	MATH2306
Faculty	
Department	
Course type	Major Needs
Course level	2
Credit hours (theoretical)	3
Credit hours (practical)	0
Course Prerequisites	

Course Objectives

1 - To show that a set of vectors forms a basis for a set and find the dimension of a subspace

2 - To find inner products and find a basis for a given inner product space

3 - To find the standard matrix for a given linear transformation and use this matrix to find the image of a given vector

4 - To find real eigenvalues and eigenvectors of the real matrices

5 - To diagonalize symmetric matrices

Intended Learning Outcomes

Intellectual Skills	* Verify whether a mapping between vector spaces is linear, and if so calculate the matrix of the mapping with respect to given bases
Professional Skills	* Find the coordinates of a vector with respect to a given ordered basis; calculate the rank of a matrix * Determine bases for the row and column spaces of a matrix * Calculate the scalar product of two vectors and determine whether the vectors are orthogonal and/or orthonormal; find the orthogonal projection of a vector onto a given subspace and the closest vector in a given subspace to a given vector
General Skill	* Construct a mathematical argument in order to deduce or prove simple facts about vectors, matrices, vectors spaces and linear maps * Learn valuable skills to discover mathematical results * Work in groups and cooperate with others

Course Contents

1 - Rank and nullity
2 - Inner product spaces - Angle and Orthogonality in Inner product spaces - Orthonormal bases – Gram-Schmidt Process- QR-Decomposition – Least Squares Orthogonal Matrices – Change of Bases
3 - Eigen values and Eigen vectors – Diagonalization – orthogonal digonalization
4 - Linear transformations – Kernel and Range – Inverse linear transformations – Matrices of general linear transformation - Similarity

Teaching and Learning Methods

1 - Lectures, Solving problems, group assignments

Students Assessment

Assessment Method	TIME	MARKS
First Mid Term	Week 6	20
Second Mid Term	Week 11	20
Homework	During semester	5
Final Exam	Week 16	50

Books and References

Essential books	Elementary linear algebra : applications version / Howard Anton, Chris Rorres. 11th Ed, 2014
Recommended books	Linear Algebra with Applications, Jeanne Agnew, Robert C. Knapp,Brooks/Cole Pub. Co., 1983
	Linear Algebra, Stephen Friedberg, Arnold Insel and Lawernce Spence,2015
	Linear Algebra with Applications ,Jeffrey Holt ,W. H. Freeman and Company 2013
	Elementary Linear Algebra, Ron Larson ,David C. Falvo ,Houghton Mifflin Harcourt Publishing Compan,6 Ed.2009