DE LA SALLE UNIVERSITY – MANILA
COLLEGE OF SCIENCE
Mathematics Department

SYLLABUS

COURSE NAME/CODE:	Linear Algebra (MTH513T)
NAME OF FACULTY:	Dr. Ederlina G. Nocon
COURSE CREDIT:	3 units
FACULTY'S E-MAIL ADDRESS:	ederlina.nocon@dlsu.edu.ph
CONTACT NO. (DEPT):	(02) 536-0270, (02) 524-4611 loc. 420/413
TERM/SCHOOL YEAR:	Term 2, AY 2015-2016
TIME/ROOM:	0900 – 1200, J203

COURSE DESCRIPTION

This is a course in linear algebra for MST Mathematics graduate students. It covers basic linear algebra tools such as matrices, matrix operations and properties and determinants, vector spaces, linear transformations, eigenvalues and eigenvectors, and diagonalization.

LEARNING OUTCOMES (LO)

I. Expected Lasallian Graduate Attributes

The students will be able to adequately attain attributes of:

1. critical thinker;
2. an effective communicator
3. a reflective lifelong learner

II. Desired Course Learning Results

The students will be able to:

- Accurately define and appropriately illustrate specific linear algebra concepts such as vector spaces and subspaces, linear independence, spanning sets, bases and dimension, linear transformation, kernel and range, characteristic polynomials, eigenvalues and eigenvectors, and diagonalizability.
- Apply the appropriate linear algebra concepts, thinking processes, tools and technologies in solving both conceptual and real-life problems.

COURSE OUTLINE

WEEK/ No. of Hours	Topics	Learning Outcomes	Assessment	Methods and Resources
Weeks 1 – 3	**1. Linear Equations and Matrices** 1.1 Matrices and Matrix Operations 1.2 Algebraic Properties of Matrix Operations 1.3 Special Classes of Matrices 1.4 The Echelon Form of a Matrix 1.5 Equivalent Matrices 1.6 Solutions of Linear Systems 1.7 The Inverse of a Matrix	• Be proficient in performing various operations on matrices and applying the properties of these operations • Use matrix operations to efficiently solve linear systems and determine the inverse of a matrix • Appreciate the concept of mathematical proofs and reasoning	• Student self-assessment and Reflection • Seatwork and Assignments • Skills exercises	• Lecture • Group discussion and presentations • Use of Excel to demonstrate procedures involving matrices • Library work
			LONG QUIZ 1	
Weeks 4 –5	**2. Determinants** 2.1 Definition and Related Concepts 2.2 Properties of Determinants 2.3 Cofactor Expansion 2.4 Inverse of a Matrix 2.5 Cramer’s Rule	• Apply the definition to evaluate the determinant of a matrix and establish the various properties of determinants. • Show proficiency in applying the properties of determinants in solving related problems and proving statements about determinants. • Show mastery in using cofactor expansion to evaluate the determinants of large matrices • Show proficiency in solving linear systems using Cramer’s rule	• Student self-assessment and Reflection • Seatwork and Assignments • Skills exercises	• Lecture • Group discussion and presentations • Library work

WEEK/ No. of Hours	Topics	Learning Outcomes	Assessment	Methods and Resources
Week 6-8	**3. Vector Spaces** 3.1 Vector Spaces and Subspaces 3.2 Linear Combinations and Spanning Sets 3.3 Linear Independence 3.4 Bases and Dimension	• Demonstrate know-ledge and understanding of concepts related to vector spaces • Apply appropriate approaches in solving problems related to vector spaces, such as testing for linear independence and spanning, and constructing bases. • Construct reasonably elegant proofs to statements involving vector spaces	• Student self-assessment and Reflection • Seatwork and Assignments • Skills exercises	• Lecture • Group discussion and presentations • Use of Excel in solving problems involving vector spaces • Library work
			LONG QUIZ 2	
Weeks 9-11	**4. Linear Transformations** 4.1 Definitions and Examples 4.2 Isomorphisms 4.3 Coordinate Vectors 4.4 Matrix of a Linear Transformation	• Demonstrate understanding of the concept of linear transformations and show proficiency in determining if a given map is a linear transformation • Recognize inter-relationship of concepts and ideas in different fields of mathematics. • Show proficiency in solving routine problems on linear transformations • Appreciate the concept and role of proof and reasoning and demonstrate skill in reading and writing proofs • Demonstrate how a matrix can be used to represent a linear transformation	• Student self-assessment and Reflection • Seatwork and Assignments • Skills exercises	• Lecture • Group discussion and presentations • Library work
			LONG QUIZ 3	

WEEK/ No. of Hours	Topics	Learning Outcomes	Assessment	Methods and Resources
Weeks 12 – 13	**5. Eigenvalues, Eigenvectors and Diagonalization** 5.1 Eigenvalues and Eigenvectors 5.2 The Characteristic Polynomial 5.3 Diagonalization 5.4 Inner Product Spaces* 5.5 Diagonalization of Symmetric Matrices*	• Appreciate the concept and role of proof and reasoning and demonstrate skill in reading and writing proofs • Demonstrate proficiency in finding eigenvalues and eigenvectors of a matrix, and in determining if a matrix is diagonalizable. • Show proficiency in using the Gram-Schmidt process to construct an orthonormal basis.	• Student self-assessment and Reflection • Seatwork and Assignments • Skills exercises	• Lecture • Group discussion and presentations • Library work
Week 14 **2 hours**	**FINAL EXAMINATION**			Written Examination

*optional topics

GRADING SYSTEM

3 Long quizzes	60%
Problem Sets	20%
Final Examination	20%

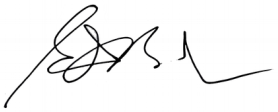
LEARNING OUTPUT

Compilation of Exercises (Problem Set Solutions)
Date Due: Week 13

SOURCES

- Datta, K. (2008), *Matrix and Linear Algebra* (2nd edition), PHI Learning Pvt. Ltd.
- Fraleigh and Beauregard, (1995). *Linear Algebra* (3rd Edition). Addison : Wesley
- Finkbeiner, D.,(2011) *Introduction to Matrices and Linear Transformations* (3rd edition), Dover Publications
- Kolman B. and Hill, D., (2003), *Elementary Linear Algebra, (7th edition)*. Upper Saddle River, NJ: Pearson Education
- Lang, S., (1987), *Linear Algebra*(3rd edition), Springer-Verlag.
- Schneider, H. and Barker, G.P., (1989), *Matrices and Linear Algebra* (2nd edition), Dover Publications, Inc.

Noted by:



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