



De La Salle University

MATHEMATICS DEPARTMENT College of Science COURSE SYLLABUS

COURSE CODE : Advanced Linear Algebra 2 (MTH713M/D)
NAME OF FACULTY : _____
FACULTY'S E-MAIL ADDRESS : _____
CONTACT NO. (DEPT) : _____
CONSULTATION HOURS : _____
TERM/SCHOOL YEAR : _____
TIME/ROOM : _____
COURSE DESCRIPTION:

A study of modules, canonical forms, orthogonal and unitary transformations, annihilators and duality of inner transformations.

COURSE OBJECTIVES : At the end of the course, the students should be able to:

1. provide students with a stronger background in Linear Algebra;
2. introduce students to concepts in linear algebra which provides a better understanding of concepts from other fields such as analysis.
3. exhibit values like:
 - 3.1 cooperation through group study;
 - 3.2 honesty by claiming credit only for the work he has done;
 - 3.3 zeal and seriousness of intent to learn by participating actively in class discussion, doing his homework regularly and consulting his mentor;
 - 3.4 patience, perseverance and diligence by solving assigned exercises completely including the difficult ones;
 - 3.5 faith by doing what is right and giving his best in performing any assigned task;
 - 3.6 show concern for the community through sharing of know-how and resources during group discussion;
 - 3.7 self-reliance by being able to solve problems independently.

COURSE OUTLINE	TIME ALLOTMENT
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I. LINEAR FUNCTIONALS, BILINEAR FORMS AND QUADRATIC FORMS	21 HRS.
1.1 Linear Functionals 1.2 Duality 1.3 Change of Basis 1.4 Annihilators 1.5 The Dual of Linear Transformation	



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- 1.6 Bilinear Forms
- 1.7 Quadratic Forms
- 1.8 The Normal Form
- 1.9 Real Quadratic Forms
- 1.10 Hermitian Forms

II. ORTHOGONAL AND UNITARY TRANSFORMATIONS 18 HRS.

- 2.1 Inner Products and Orthonormal Bases
- 2.2 Inner Products Representation of Linear Functionals
- 2.3 The Adjoint Transformation
- 2.4 Orthogonal and Unitary Transformations
- 2.5 Orthogonal and Unitary Matrices
- 2.6 Superdiagonal Form
- 2.7 Normal Matrices
- 2.8 Normal Linear Transformation
- 2.9 Hermitian and Unitary Matrices

FINAL EXAMINATION 3 HRS.

TEACHING STRATEGIES/METHODOLOGY:

To achieve the course objectives, a combination of lecture, group discussion and solution of problem sets will be used. For the research requirements, students are advised to access the databases included in the reading list below.

REQUIREMENTS OF THE COURSE:

- 1. Two Long Quizzes
- 2. Final Exam
- 3. Problem Sets

GRADING SYSTEM:

Average of Long Exams	50%
Final Exam	30%
Problem Sets	20%

GRADING SCALE:

93-100	4.0
87-92	3.5
80-86	3.0
70-79	2.5
60-69	2.0

TEXTBOOK: Nering, E.D. **Linear Algebra and Matrix Theory, 2nd edition,**
John Wiley and Sons, Inc. USA, 1970



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REFERENCES:

- Herstein, I.N. and D.J. Winter, Matrix Theory and Linear Algebra,
Macmillan Publishing Company, USA, 1989
- Hoffman, K. & Kunze, R., Linear Algebra, 2nd ed., Prentice Hall, Inc., USA, 1977
- Johnson, R.E., Linear Algebra, Prindle, Weber & Schmidt, Inc., USA 1967
- Lang, S., Linear Algebra, 2nd ed., Addison-Wesley Publishing Co, Inc. , USA 1971
- Algebra by Thomas W. Hungerford, Springer-Verlag, NY 1996, c 1974
- Algebra by Saunders Maclane and Garrett Birkhoff,
Macmillan, 2nd ed., 1979, c 1967

READING LIST:

- <http://www.netlib.org/>
- <http://archives.math.utk.edu/topics/linearalgebra.html>
- <http://cerebro.xu.edu/math/appliedlinear>