Linear Algebra – MAS 5145

Catalog description: Linear transformations, eigenvalues and eigenvectors, characteristic and minimal polynomials, rational and Jordan canonical forms, determinants, quadratic forms, orthogonal diagonalization of symmetric matrices, unitary and Hermitian transformations.

Prerequisites: MAS 4107, Linear Algebra 2, or permission of the instructor.

Corequisites: None.

Required Text: *Linear Algebra* by K. M. Hoffman and R. Kunze

Supplementary Text: None.

Course description: This course is a one-semester introduction to the foundations of the linear algebra at the introductory graduate level.

Instructional objectives:

- Master the basic notions and techniques of linear algebra

- Develop proof-writing skills and communication of mathematical ideas

- Apply the major theorems of linear algebra

Method of instruction: Lecture.

Schedule of topics covered:

Topic	Approx. Number of weeks
Vector spaces, linear dependence, dimension, linear transformations	2 weeks
The endomorphism algebra of a vector space	2 weeks
Matrices and determinants, eigenspaces	2 weeks
Characteristic and minimal polynomials, canonical forms	2 weeks
Quadratic forms, inner product spaces, orthogonal transformations	2 weeks
Hermitian forms, principle axis theorem	2 weeks

Assessment procedures: Homework 50%, midterm exams 20%, and a final exam 40%.

Grading criteria: 92-100%=A, 90-91%=A-, 88-89%=B+, 82-87%=B, 80-81%=B-, 78-79%=C+, 70-77%=C, 60-69%=D, 0-59%=F

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References

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[2] DYM, HARRY, *Linear algebra in action*, American Mathematical Society 2006

[3] GOLAN, JONATHAN S., *The linear algebra a beginning graduate student ought to know*, Springer 2007

[4] HALMOS, PAUL R., *Linear algebra problem book*, Mathematical Association of America 1995

[5] KATZNELSON, YITZHAK AND YONATAN KATZNELSON, *A (Terse) Introduction to linear algebra*, American Mathematical Society 2008

[6] LANG, SERGE, *Linear algebra*, Springer 1987

[7] LAX, PETER D., *Linear algebra*, John Wiley & Sons 2007

[8] ROMAN, STEVEN, *Advanced linear algebra*, Springer 2008

[9] ROSE, HARVEY E., *Linear algebra: a pure mathematical approach*, Birkhäuser 2002

[10] SAHAI, VIVEK AND VIKAS BIST, *Linear algebra*, Alpha Science 2002