MATH 574 SYLLABUS – FALL 2022

ROBERT GURALNICK

CLASS: MATH 574
CLASS #: 39762R

Room: KAP 414
Time: MW 4:45-6:00

Instructor: Robert Guralnick
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Office Hours: TBA

Homework and other information posted at Blackboard: blackboard.usc.edu

Required Text: Horn & Johnson, Matrix Analysis, 2nd Edition, Cambridge University Press
Recommended Supplementary Text: Greenleaf & Marques, Linear Algebra I, II, available from AMS in paperback and online

Course Goals: To introduce the main concepts and ideas of matrix theory and linear algebra and to indicate how matrices can be used in other aspects of mathematics.

Prerequisites: No formal prerequisites but some familiarity with linear algebra and/or abstract algebra would be helpful.

Course Description: Some of the topics to be included are: Introduction to rings, fields, vector spaces, matrices, linear transformation; Equivalence of matrices with applications to determinants, linear system theory; similarity of matrices and canonical forms with applications to matrix equations; functions of matrices with applications to differential equations; Special classes of matrices and representation theorems for real and complex matrices; Quadratic and hermitian forms with applications to roots of polynomials and stability; Singular Value Decomposition; Nonnegative matrices including Perron-Frobenius theory. Normed vector spaces. Other topics as time permits. We will work over a general field aside from the cases where we need to work over the real or complex numbers. We will use the matrix point of view as well the point of view of considering linear transformations of vector spaces.

Grading: There will be approximately 4 homework assignments to be turned in (there will be other homework assigned as well). There will be a final (possibly take home). Each homework assignment will count for 20% and the final 20%.
First day of Class: Monday, August 22. Last day of Class: Friday, December 2.

Final: Wednesday, December 7th, 4:30–6:30