Tandon School of Engineering, New York University

Department of Electrical and Computer Engineering

ECE-GY 5253: *Applied Matrix Theory*

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Contact hours: before/after class
or, by appointment
Room 1001, Jay 370

Course Outline

Week	Subject
I	Elementary facts about matrices and determinants
II	Theory of linear equations
III	Eigenvalues and eigenvectors
IV-VI	Canonical forms and transformations
VII	The Jordan canonical form
VIII	**Midterm**
IX-X	Norms, location of eigenvalues, and singular value decomposition
XI	Matrix analysis of differential and difference equations
XII	Application to stability analysis of linear systems
XIII	Computational Issues and Applications in Machine Learning
XIV	Nonnegative matrices
XV	**Final** (12/18/2023)

References:

• (Recommended Text) R.A. Horn and C.R. Johnson, *Matrix Analysis*. 2nd edition. Cambridge Univ. Press, 2013. ISBN: 978-0-521-54823-6
• A. J. Laub, *Matrix Analysis for Scientists and Engineers*. SIAM, 2005.
• (Math.-oriented) F. R. Gantmacher, *The Theory of Matrices*. Vol. I & Vol. II, 1953.
• Class notes.

Grading Policy: Midterm: 35% , Final: 45%, Homework: 20%

TAs: Leilei Cui, Won Yong Ha, Thiviya Kumaran, Sayan Chakraborty

Note: All lecture notes and weekly homework/ HW solutions will be posted at the course site in the NYU LMS.