

ME566 Syllabus Spring 2022

Professor Eytan Barouch | eytanbrch@gmail.com
Mondays, Wednesdays | 4:30pm-6:15pm | PHO 202

A. Linear Algebra.

1. Determinants
2. Systems of linear algebraic equations.
3. Elementary properties of matrices and eigenvalue theory.
4. Diagonalization of a matrix
5. Cayley-Hamilton Theorem (CHT) and its computational applications.
6. Application to systems of linear DE

B. Ordinary differential Equations(DE).

1. First order linear DE with constant and variable coefficients.
2. Special non-linear first-order DE: Bernoulli and Riccati equations.
3. Second order homogeneous and non homogeneous DE with constant coefficients
4. Methods for particular solutions of non homogeneous DE.
5. Relation between Riccati equation and second-order DE
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C. Complex Analysis.

1. Arithmetics of complex numbers
2. Functions of complex variables
3. Analyticity and criteria for it. Cauchy theorem.
4. De-Moivre theorem and its applications.
5. Laurent series and residuum calculations.
6. Applications of complex analysis to integration, series summations.

D. Partial Differential Equations(PDE)

1. Multi-variate calculus definitions and identities.
2. Analysis of gradient, divergence and curl of vectors.
3. Diffusion equations in 1D and 3D.
4. Wave equations in 1D, 3D and Schroedinger equation.