ME566 Syllabus Fall 2021

Professor Eytan Barouch | <u>eytanbrch@gmail.com</u> Mondays, Wednesdays | 4:30pm-6:15pm | PHO 201

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 Ricatti 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

7.

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.