One-year course on Partial Differential Equations in Continuum Transport Processes I and II for the graduate students having strong background in mathematics and physics.

Name of Lecturer/s: Professors Boris Zaltzman and Golan Bel

Pre-Requirements: Ordinary Differential Equations, Advanced Analysis

Grade: 3 Assignments (50%) + Final Examination (50%) 1-2-4061 (3 credits)

Partial Differential Equations in Continuum Transport Processes II 1

2. Basic equations of mathematical physics. Telegraph equation, heat conduction equation, wave equation and Laplace equation. Singularities and discontinuous solutions, elements of Variational Analysis, Dirichlet principal, Determination of minimalizer's class. Physical Examples (Burgers Equation, Nernst-Planck-Poisson equations in electrodiffusion of ions and semiconductor devices).


4. Elements of numerical analysis: finite differences and finite elements methods.


Bibliography:


• R. Courant and D. Hilbert, Methods of Mathematical Physics, New York: Wiley-Interscience, 1989


• O. Dimon, Foundations of Potential Theory Berlin : Springer-Verlag, 1967

• R. S. Pathak, A Course in Distribution Theory And Applications: Alpha Science, 2001