# TEMPLE UNIVERSITY

Department of Mathematics

## Analysis Seminar

Room 617 Wachman Hall

Monday, March 20th, 2023, 2:30 p.m.

*On the analyticity of the Nernst-Planck-Darcy system*

by Elie Abdo

Temple University

**Abstract:** We consider an electrodiffusion model describing the time evolution of the concentrations of many ionic species, with different valences and diffusivities, in a two-dimensional incompressible fluid flowing through a porous medium. The ionic concentrations evolve according to the nonlinearly advected and nonlinearly forced Nernst-Planck equations. The velocity of the fluid obeys Darcy's law, forced by the nonlinear electric forces occurring due to the motion of ions. The resulting Nernst-Planck-Darcy (NPD) model is a locally well-posed dissipative system of nonlinear elliptic and parabolic partial differential equations. In this talk, we address the existence of a unique global smooth solution to the NPD system and prove its spatial analyticity.