Mathematics Colloquium

University of Texas at Arlington - Department of Mathematics
Proudly Presents:

Natalia Komarova
UC San Diego, CA

Friday, November 8th, 2024
2:00 pm – 3:00 pm
PKH 311

"Mathematical Modeling of Drug Resistance in Cancer"

Abstract:
Resistance to drugs is one of the most challenging problems in public health. In this talk, I will focus on drug resistance in cancer, which is often associated with the existence of resistant mutants in the evolving population of malignant cells. I will start by showing the type of stochastic modeling that has been used to quantify various aspects of resistance generation, including multiple-drug resistance, the role of cellular turnover, cellular quiescence, and the phenomenon of cross-resistance. I will compare and contrast treatment strategies such as cycling and simultaneous multi-drug treatment. I will then focus on a specific case of Chronic Lymphocytic Leukemia (CLL). This is the most common leukemia, mostly arising in patients over the age of 50. The disease has been treated with chemo-immunotherapies with varying outcomes, depending on the genetic make-up of the tumor cells. More recently, a promising tyrosine kinase inhibitor, ibrutinib, has been developed, which resulted in successful responses in clinical trials, even for the most aggressive chronic lymphocytic leukemia types. The crucial questions include how long disease control can be maintained in individual patients, when drug resistance is expected to arise, and what can be done to counter it. Computational evolutionary models, based on measured kinetic parameters of patients, allow us to address these questions and to pave the way toward a personalized prognosis and treatment.

Bio: Natalia Komarova holds an MS in Theoretical Physics from Moscow State University and a PhD in Applied Mathematics from University of Arizona. After being a Member at the Institute for Advanced Studies in Princeton (1999-2003), she became Assistant Professor at the Department of Mathematics at Rutgers, and then worked at UC Irvine from 2004 until 2024, when she joined UCSD. Komarova is interested in Applied Mathematics, and in particular, in Mathematical Biology, evolution, and modeling of complex social phenomena.

Refreshments before the talk and socializing following the talk
http://www.uta.edu/math/seminars