Postdoctoral Position in
Statistical Methods in Infectious Disease Epidemiology
The Ohio State University (Columbus, Ohio)

We seek a postdoctoral fellow to join an interdisciplinary team of epidemiologists, statisticians and computer scientists working on a novel method of analyzing and predicting epidemics with a specific application to COVID-19. The team is based in the College of Public Health and the Mathematical Biosciences Institute at The Ohio State University.

The candidate should have strong background in mathematical models of epidemics, epidemiologic methods, and biostatistics. He or she should also have programming experience in R or Python. The initial position would be for 12 months with the possibility of an extension. The position is partially funded through the following NSF RAPID project described below. In addition to participating in NSF research project the successful applicant will also be a part of Ohio state campus surveillance team collecting and analyzing student COVID-19 testing and vaccination data. The start date for the position is flexible with the expecting starting date between 1st August, 2021 and 1st January 2022.

Please contact Greg Rempala (rempala.3@osu.ed) or Eben Kenah (kenah.1@osu.edu) for details.

RAPID: Modeling Outbreak of COVID-19 Using Dynamic Survival Analysis
PIs: Grzegorz Rempala and Eben Kenah

SUMMARY:
The outbreak of COVID-19 has created a tremendous need for predicting both the dynamics and the size of regional COVID-19 outbreaks. Equally important is the need to determine the potential effects of interventions such as vaccination, school closures and mandatory or self-imposed quarantines. To answer these questions, this project will develop a new stochastic general mathematical framework for analyzing the ongoing outbreak trends using both public and private (OSU campus surveillance program from 20/21 academic year) data. The PI's new framework will not assume anyspecific infectious or recovery periods (which are often unknown) or observable prevalence of the disease. The tools developed as part of this project will both help predict the rate of growth of newinfections and estimate the effect of social distancing and other preventative measures on flattening the epidemic curve. The project will also provide a practical interdisciplinary training for a PhD student and a post-doctoral fellow. The modeling and predictive framework to be developed is fundamentally different from the traditional approach based on the incidence or prevalence counts in a compartmental SIR model. Specifically, the PIs will apply the dynamical survival analysis (DSA) approach that considers aggregated mean field equations for the underlying large stochastic network and regards them as the approximate survival law of the infection times. The PIs will use these DSA-based equations to model both the epidemic and recovery curves and compare them with the ones observed during the COVID-19 outbreak. The statistical analysis of epidemic data performed with the help of the new framework will allow the quick elucidation of the dynamics of an epidemic (for example, the basic reproduction number, R0) and the potentialimpact of interventions (such as quarantine or social distancing). The new framework will help provide a better understanding of how preventive behaviors affect COVID-19 dynamics via changes in the network structure and changes in disease transmission across edges in the network. This project will develop a user-friendly software package for computer simulations under different parameter and intervention scenarios (for example, vaccination schemes) that will lead to a better understanding of how to control COVID-19 transmission.