Abstract:

The H1N1 pandemic of 2009, the 2014-2015 Ebola outbreak in West Africa and the recent Zika outbreak serve as a reminder of the social, economic and health burden of infectious diseases.

An effective strategy to predict, prevent, and manage an emerging disease outbreak includes the ability to: (i) anticipate when and where it may occur, taking into account many interdependent driving factors; (ii) anticipate public reaction to an outbreak, and

(iii) develop actionable policies that enable a well-targeted response. Computer models facilitate controlled in silico epidemiological experiments that are otherwise impossible to carry out for ethical or practical reasons. High performance computing, data science and new sources of data gathered at the individual level through mHealth, social media and other administrative sources have created unprecedented opportunities to prevent, detect, and respond to pandemics.

In this talk, we will discuss how multi-scale models and tools were used to support planning and near real-time response in the event of epidemics. The role of computational thinking, high performance computing, decision-support environments and behavioral adaptation will be highlighted.

We will conclude by identifying the current gaps and opportunities for future research in multi-scale computational modeling and analysis to support epidemic science.