Available Projects - Dr. John Drake

*Predictive Intelligence for Pandemic Preparedness: This project is part of an NSF-funded, interdisciplinary project aimed at showing how the system-of-systems paradigm can be used to synthesize across different modeling frameworks for understanding the emergence of novel pathogens. The successful applicant should have a background in biological systems theory, dynamical systems, computer simulation, and/or systems engineering. The project will focus on developing new theory related to feedbacks between epidemics (e.g. outbreak intensity) and human perceptions, beliefs, and behaviors (e.g. vaccine hesitancy). The applicant will work with interdisciplinary collaborators, including social scientists, biologists, and engineers.

*Interactive model for Ebola spillover: This project is part of an NIH-funded, interdisciplinary project aimed at identifying the conditions under which the Ebola virus spills over from its wildlife reservoir into humans. It is believed that this is related to ecological change that accompanies the transition from rainy to dry season in sub-Saharan Africa. Preliminary work developed a differential equation model for transmission. The current project would seek to develop an interactive interface for non-specialists to apply and query the model. The successful applicant should have a background in epidemiological theory and R programming, including the ability to write R Shiny applications. The applicant will work with an interdisciplinary team of modelers, biologists, and ecologists at the University of Georgia and Oklahoma State University.

*An algorithm for forecasting respiratory infections: This project aligns with ongoing activities of the Center for the Ecology of Infectious Diseases Forecasting Working Group. This working group is developing new models and computational workflows for predicting both seasonal and pandemic outbreaks of respiratory infections like influenza and SARS-CoV-2. A recent breakthrough allows us to fit models to a wide range of covariate data simultaneously. The next step is to enable “panel fitting” (such as is now routinely done in econometric forecasting) to allow information-sharing across spatially distributed reporting locations. The successful applicant should have a background in biological or economic modeling, time series analysis, and/or statistical forecasting. The applicant will work with an interdisciplinary team of biologists, epidemiologists, computer scientists, and engineers in the CEID Forecasting Working Group.

*Developing an atlas of macroparasite abundance: This project seeks to develop the first comparative database of macroparasite abundance in animals. Recent advances in comparative ecology of parasites have yielded tremendous insights into the evolution of the parasitic lifestyle and the mechanisms underlying host-switching and disease emergence. But, no such databases exist for investigation in macroparasites like fleas, ticks, and worms. This project is part of a new interdisciplinary and inter-institution working group. This project will emphasize

team science, and provide opportunities for this position to demonstrate intellectual leadership and guide the activities of the team. The successful applicant will have a background in parasitology, veterinary medicine, or disease ecology. The applicant will work with an interdisciplinary team of vets and ecologists to compile the database and identify global trends in the distribution and abundance of macroparasites.