

**Events**[Current Events](#)[Lectures](#)[Events Archive](#)

Computational Mathematics Seminar Series

An Immuno-epidemiological Model of Foot-and-Mouth Disease in African Buffalo**Summer Atkins**

Postdoctoral Researcher, LSU

Digital Media Center 1034
October 31, 2023 - 03:30 pm**Abstract:**

We present a novel immuno-epidemiological model of Foot-and-Mouth Disease (FMD) in African buffalo host populations. Upon infection, the hosts can undergo two phases, namely the acute and the carrier stages. In our model, we divide the infectious population based upon these two stages so that we can dynamically capture the immunological characteristics of the disease and to better understand the carrier's role in transmission. We first define the within-host immune kinetics dependent basic disease reproduction number and show that it is a threshold condition for the local stability of the disease-free equilibrium and existence of endemic equilibrium. By using a sensitivity analysis (SA) approach developed for multi-scale models, we assess the impact of the acute infection and carrier phase immunological parameters on the basic reproduction number. Interestingly, our numerical results show that the within-carrier infected host immune kinetics parameters and the susceptible individual recruitment rates play significant roles in disease persistence, which are consistent with experimental and field studies. This is joint work with Dr. Hayriye Gulbudak (University of Louisiana at Lafayette), Dr. Shane Welker (University of North Alabama), and Houston Smith (LSU).

Speaker's Bio:

Summer Atkins is a Postdoctoral Researcher at LSU. Her research interests are in mathematical biology and control theory. She obtained her PhD in Mathematics at the University of Florida (UF) in 2021. During her time at UF, she was a recipient of two graduate student fellowships and a departmental teaching award. In Spring 2024, Summer Atkins will be joining the University of Alabama in Huntsville's Department of Mathematical Sciences as an Assistant Professor.

This lecture has refreshments @ 03:00 pm