



Virginia Commonwealth University
VCU Scholars Compass

Biology and Medicine Through Mathematics
Conference

2022

May 19th, 4:00 PM - 4:30 PM

Using a Network Model to Control the Spread of an Infectious Disease on a College Campus with Contact Tracing

Christopher R. Boyette
Elon University, cboyette@elon.edu

Follow this and additional works at: <https://scholarscompass.vcu.edu/bamm>



Part of the [Life Sciences Commons](#), [Medicine and Health Sciences Commons](#), and the [Physical Sciences and Mathematics Commons](#)

<https://scholarscompass.vcu.edu/bamm/2022/thur/15>

This Event is brought to you for free and open access by the Dept. of Mathematics and Applied Mathematics at VCU Scholars Compass. It has been accepted for inclusion in Biology and Medicine Through Mathematics Conference by an authorized administrator of VCU Scholars Compass. For more information, please contact libcompass@vcu.edu.

Name: Christopher Boyette

Title: Using a Network Model to Control the Spread of an Infectious Disease on a College Campus with Contact Tracing

College campus environments provide a breeding ground for the spread of diseases due to students studying, living, and interacting in close proximity. To study this issue, a susceptible-infected-susceptible type model is studied on a dynamic, highly cliqued network to analyze the effect of contact tracing, quarantining, and asymptomatic testing on the spread of infectious disease. The network structure mirrors a college dormitory environment and utilizes measures taken by college campuses to limit disease transmission. Monte Carlo simulations are then conducted to determine the effectiveness of different control measures in a randomized setting. From these simulations, the critical quarantine threshold required to prevent disease spread is identified. Using conditional probabilities to determine the status of a node at a specific time, ordinary differential equations are developed and compared with a compartment model. The results of this study may provide insights into what type of policy could be implemented in a future epidemic situation.