



CSEB Workshop

Introduction to mathematical models of infectious diseases

Date and time: February 9, 2022 from 12:00pm to 2:00pm EDT

Target Audience: Beginner

Preferred number of participants: no limit

Workshop Style: Blend of interactive and lecture

Software/data requirements: Excel, R

Admission fee: \$25 CAD plus taxes (\$0 for CSEB Members)

Register here: <https://events.eplly.com/2021CSEBMathematicalModels>

Workshop Description:

As seen throughout the COVID-19 pandemic, infectious disease projections can offer critical insights to inform the selection of optimal public health measures and health systems preparedness. Unlike other diseases, the study of infectious diseases requires a special set of tools, referred to collectively as mathematical models, given the non-independence of events. However, most epidemiologists and biostatisticians receive limited (if any) training in these methods and, consequently, these models are often viewed as “black boxes”. The aim of this workshop, is to demystify these methods and provide participants with an overview of the fundamental concepts related to the use of mathematical models of infectious disease transmission, including the SIR (susceptible – infected – recovered) compartmental model and its variants (e.g. to include additional disease states, vaccination, etc.). We will also cover common ways of considering heterogeneity in these models (e.g. age structure, social contacts, and seasonality), parameter estimation, and uncertainty and sensitivity analyses. Further, we will discuss what these models can – and cannot – do, their limitations, and how to best communicate mathematical modeling work. We will discuss recent high-profile examples of the use of these models, namely COVID-19 and Ebola, as well as other examples (e.g. measles, HIV, malaria, etc.). We will also bring to your attention some more advanced topics, such as metapopulation models, agent-based models and Bayesian approaches; however, these will not be covered in detail during this workshop. The workshop will include didactic and hands-on components, with examples provided in Excel and R.

Learning objectives:

- Provide an introduction to mathematical epidemiology, and why the study of infectious disease dynamics requires a different set of analytical tools.
- Develop a fundamental understanding of common mathematical modeling approaches- Gain hands-on experience using these methods.
- Increased awareness of the strengths and limitations of mathematical models of infectious diseases.

Workshop Facilitator:

Tiffany Fitzpatrick, PhD MPH, is a Canadian Institutes of Health Research (CIHR) Banting Postdoctoral Fellow in the Department of Epidemiology of Microbial Diseases at the Yale School of Public Health. Her current research focuses on the epidemiology of pediatric respiratory viruses, such as respiratory syncytial virus (RSV), with an emphasis on health equity and public health policy. In her current position with the Yale Public Health Modeling Unit, she is developing a metapopulation model for RSV, which considers spatial and temporal variations in transmission dynamics, to inform the selection of optimal RSV vaccination strategies.

