This book provides a systematic introduction to the fundamental methods and techniques and the frontiers of — along with many new ideas and results on — infectious disease modeling, parameter estimation and transmission dynamics.

The text provides complementary approaches, from deterministic to statistical to network modeling; and it seeks viewpoints of the same issues from different angles, from mathematical modeling to statistical analysis to computer simulations and finally to concrete applications.

This book should appeal to advanced undergraduate and, graduate students in applied mathematics; non-experts who are interested in modeling infectious disease transmission and public health problems.