

<<传染病的建模与动力学>>

图书基本信息

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前言

This book contains a carefully chosen and coordinated series of lecture notes at the China-Canada Joint Program on Infectious Disease Modeling, held in Xi'an Jiaotong University, May 10-29, 2006. The joint program consists of a summer school attended by over 100 students from a variety of backgrounds, and a workshop participated by invited speakers from both academic institutes and public health agencies such as the US Centers for Disease Control and Prevention (CDC) and Public Health Agency of Canada (PHAC). These contributions are grouped into three categories: lectures that briefly introduce the basic concepts and techniques; survey articles that provide reviews on some specific diseases or issues; and research papers dedicating to some important problems of current interest in the epidemiological modeling. There are also two articles describing some recent progresses by a Chinese and a Canadian team. The aim of this book is to provide fundamental methods and techniques for students who are interested in epidemiological modeling, and to guide junior research scientists to some frontiers in the interface of mathematical modeling and public health. Contributions are provided from different and complementary angles, with the balance between the theory and applications, between mathematical modeling and its applications to public health policy. It is hoped that this book can help in increasing the awareness of the importance of mathematical modeling in the study of infectious disease transmission, and in bridging the gap between mathematical modelers in basic theoretical research and medical scientists and public health policy makers working in health research institutes. There has been a long history of mathematical epidemiology and there are many successful stories in applying mathematical modeling to optimal design of feasible public health policy for disease prevention, control and management. Some emerging and re-emerging infectious diseases such as HIV, FMD, SARS and pandemic influenza have generated substantial renewed interest and have been continuing to challenge modelers for effective mathematical and computational models. Covering a comprehensive range of topics, this book hopefully provides an alternative and additional textbook for graduate students in applied mathematics, health informatics, applied statistics and qualitative public health.

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内容概要

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. It 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.

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章节摘录

The goal of this synthetic paper is to introduce a part of research directions on epidemic dynamics investigated by our group and our main results during the past several years. Before this, some basic knowledge on epidemic dynamics will be introduced which may be helpful to those readers who are not familiar with the mathematical modeling of Epidemiology.

1 Basic knowledge on epidemic dynamics

Epidemic dynamics is an important method of studying the spread of infectious disease qualitatively and quantitatively. It is based on the specific property of population growth, the spread rules of infectious diseases, and the related social factors, etc., to construct mathematical models reflecting the dynamic properties of infectious diseases. To analyze the dynamical behavior and to do some simulations. The research results are helpful to predict the developing tendency of the infectious disease to determine the key factors of the spread of infectious disease and to seek the optimum strategies of preventing and controlling the spread of infectious diseases.

In contrast with classic biometrics, dynamical methods can show the transmission rules of infectious diseases from the mechanism of transmission of the disease, so that people may know some global dynamic behavior of the transmission process. Combining statistics methods and computer simulations with dynamic methods could make modeling and the original analysis more realistic and more reliable. This makes the comprehension for spread rule of infectious diseases more thorough.

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