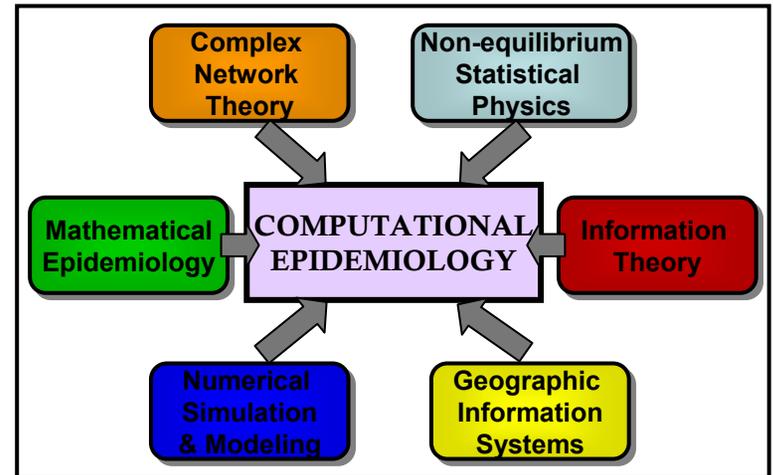


# INFO I590 PANDEMICS

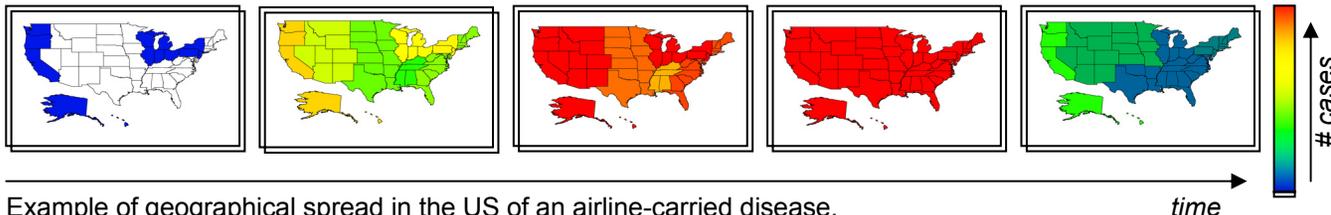
## Introduction to Computational Epidemiology

Infectious diseases appear to be very often in the news lately, with the emergence or re-emergence of viruses such as **SARS**, **avian influenza**, **HIV-AIDS**, **Lyme disease**, **West Nile virus**, "mad cow" disease, and the evolution of previously known strains developing e.g. resistance to specific drugs. In this context, tools and methods borrowed from different disciplines are becoming increasingly important in the study and analysis of the spread and control of infectious diseases. **Computational epidemiology** has recently emerged as a new area of research that integrates mathematical and statistical epidemiology with computational sciences and informatics tools in order to provide a new approach to conduct scenario analysis in public health domain. The course will provide a self-contained and integrate presentation of topics in **large scale simulations**, **geographic information systems**, **networks**, **disease** and **population modeling** approaches that are needed to access these new challenging areas of research and professional work focused on **epidemic/population forecast/analysis** and **risk assessment**.



### Topics:

- introduction to infectious disease epidemiology
  - biological epidemiology
  - cyber epidemiology
- modeling of infectious diseases
  - statistical methods
  - discrete mathematics
  - computational methods
- population biology
- complex networks analysis
  - information networks
  - infrastructure networks
  - social networks
- large scale simulations
- data mining and integration
  - historical health data
  - population movement data
  - demographic data
  - additional societal data
- geographic information systems
  - analysis of health-related data
  - visualization
  - map design for health study



Example of geographical spread in the US of an airline-carried disease.

**Instructors:**  
V. Colizza, A. Vespignani  
**Time:** 2.30pm-3.45pm MW  
**Place:** BH 015