UNIVERSITÀ DEGLI STUDI DI PADOVA

DIPARTIMENTO DI SCIENZE STATISTICHE

PHD COURSE IN STATISTICS

# Specialist Course | Cycle XXXVI

## July, 2021 | Online

# *The Population Dynamics of Infectious Diseases*


## Piero Manfredi

***Università di Pisa***


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| **Tuesday** | **July 13** | **09.30 – 12.30**<br>**15.30 – 18.30** | **Streaming** |
| **Wednesday** | **July 14** | **09.00 – 13.00** | **Streaming** |

**Program**
https://www.stat.unipd.it/fare-ricerca/courses-202021-xxxvi-cycle

# The population dynamics of infectious diseases

**Pietro Manfredi| Università di Pisa**

**Course Description**

In the last three decades, thanks to a number of pioneering works aiming to integrate models with data, the mathematical theory of infectious diseases has experienced an extraordinary momentum eventually becoming a central supporting tool for public health policy, as also documented by the current pandemic crisis.
Though some of these public health models are highly sophisticated both from the computational and data requirements' viewpoints, at the heart of the discipline there lies a fruitful mixing of classical mathematical demography and diffusion theory. In this short course I will provide an overview of the main ideas of the theory, starting from classical population mathematics and the classical mathematical theory of epidemics, and eventually landing on the modern approaches to the analysis and control of both epidemic infections, as COVID-19, as well as of endemic infections, as measles. I will conclude with an overview on modern behavioral epidemiology of communicable infections and its applications to the main current challenges of public health, such as vaccine hesitancy.

**Contents**

- Formal demography. The stable population model(s): various forms. Multistate demography.
- Transmissions and control of communicable diseases. Epidemic vs endemic infections.
- COVID-19.
- $R_0, R_E, R_t$. An overview.
- Some noteworthy applications.
- Behavioral epidemiology.