Modelling the interaction between disease spread, information and public health interventions:

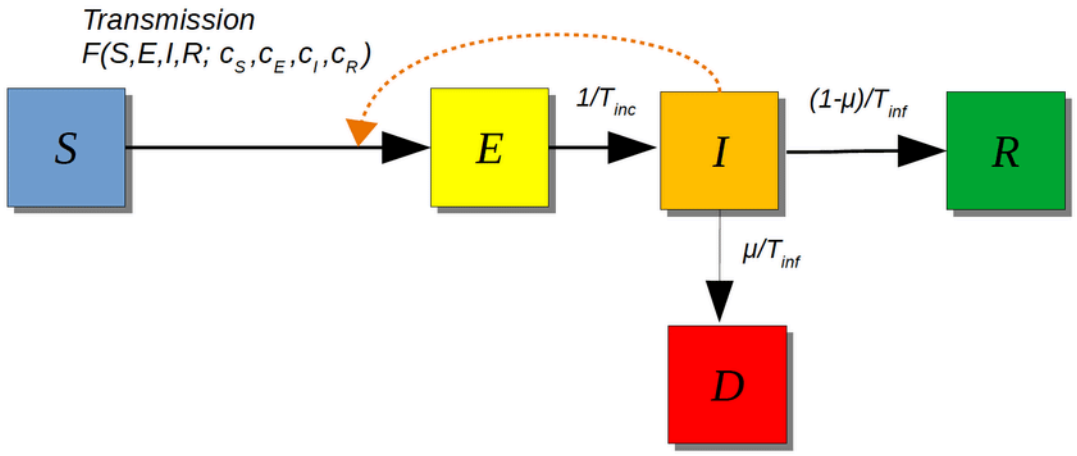
PhD Studentship proposal

About the PhD

Many factors influence how pathogens (bacteria and viruses) spread in human populations. The characteristics of the host (person), the pathogen (virus or bacterium) and the environment as well as their interaction determine how likely individuals are to be exposed, how susceptible they are to infection, and how likely they are to transmit the disease to someone else. Public health interventions such as vaccines, quarantines, masks or social distancing can modify the spread of human disease by influencing the hosts' characteristics as well as how individuals interact. Recent outbreaks have also shown that not only can the spread of information about diseases and public health interventions modify how diseases spread, but can itself spread in a manner similar to pathogens.

We are looking for a talented PhD student to model the complex interaction between disease transmission, information spread and public health intervention in a diverse population. Such a model has the potential to be used to design more efficient health interventions and test their effectiveness before they are rolled out — a significant contribution to public health.

Specifically the successful PhD candidate will combine real-world and simulated data, as a basis to design a multilayered mathematical model based on the compartmental SEIR (Susceptible-Exposed-Infected-Recovered) approach.



The SEIR Model

The successful PhD student will join the Azrieli Faculty of Medicine at Bar-Ilan University. They will be supervised by Professor Michael Edelstein, Professor of Infectious disease Epidemiology and Public Health, and Dr Yair Daon, mathematician with extensive experience in the development and analysis of mathematical models for infectious diseases.

Location

The student will be based at the Azrieli Faculty of Medicine, Bar-Ilan University in Tsfat, Northern Israel. While Remote working is possible, the student is expected to attend courses, monthly seminars and twice monthly supervisor meetings at the faculty.

The Azrieli Faculty of Medicine

The Old City of Tzfat

Funding

The student will receive a stipend for the duration of the PhD.

Eligibility Criteria

Required:

Candidates are expected to hold a Masters degree (with thesis) in one of the following topics: epidemiology, public health, or another relevant subject with a strong quantitative background (e.g. computational biology, mathematics, physics etc.). An understanding of quantitative methodologies, a willingness and ability to learn or refresh mathematical concepts, and a desire to learn and apply advanced analytics is essential. Basic grasp of programming is necessary, with a desire to improve proficiency. The candidate must speak English. Candidates from outside of Israel must be willing to relocate.

The following are an advantage but are not essential to apply:

-Understanding and / or knowledge of disease transmission models.

-Understanding of ordinary differential equations and dynamical systems..

-Background in probability theory, e.g. knowledge of common probability distributions.

-Intermediate or advanced use of Python.

There is no specific start date but early application is advised as recruitment will stop as soon as a suitable candidate is identified.

Applications should be made by email directly to Michael.edelstein@biu.ac.il and include:

-A detailed CV (2 pages maximum) including publications if applicable.

-A short cover letter in English (1 page maximum) highlighting your motivation for applying and your research experience and capabilities.