School of Computing, Engineering, and the Built Environment
Edinburgh Napier University

PHD STUDENT PROJECT

Application instructions:
Detailed instructions are available at :
https://www.napier.ac.uk/research-and-innovation/doctoral-college/how-to-apply

Prospective candidates are encouraged to contact the Director of Studies (see details below) to discuss the project and their suitability for it.

Project details

Supervisory Team:

- DIRECTOR OF STUDY: Dr Stathis Tingas (Email: e.tingas@napier.ac.uk)
- 2ND SUPERVISOR: Dr Nick Wheelhouse and Dr Neil Urquhart

Subject Group: Engineering & Mathematics

Research Areas: Mathematical Modelling, Applied Mathematics, Evolution, Immunology, Ecology and Machine Learning

Project Title: New frontiers in zoonotic disease modelling and policy guidance: bridging the gap between epidemiological and evolutionary dynamics

Project description:

The proposed multidisciplinary project focuses on pioneering a novel approach to model the transmission of infectious (zoonotic) diseases. This groundbreaking project's overarching goal is to integrate epidemiological and evolutionary dynamics by harnessing advanced mathematical modelling techniques and artificial intelligence methods. At the core of this work is the recognition that pathogens undergo evolutionary processes, leading to the emergence of multiple strains. However, these evolutionary dynamics, driven by ecological processes and immune responses, are often overlooked in mathematical epidemiological models designed to predict disease spread. This project will centre on two types of zoonotic diseases with distinctly different epidemiological profiles, to establish a new framework, from which we anticipate gaining fresh biological insights for both diseases. The innovation at the heart of this proposal seeks to revolutionize the way we model infectious disease transmission, transcending the specific type of

disease. This endeavour positions Edinburgh Napier University at the forefront of research development in this critical area. The resultant framework will serve as a valuable tool for policymakers when making decisions regarding future epidemics arising from zoonotic diseases.

Candidate characteristics

Education:

A first degree (a minimum 2:1) in Applied Mathematics, Computational Biology, Mathematical Biology

Subject knowledge:

Modelling infectious disease transmission, Population dynamics, Computational methods

Essential attributes:

- Experience of fundamental modelling of dynamical systems of infectious disease transmission
- Competent in programming
- Knowledge of compartmental deterministic modelling
- Good written and oral communication skills
- Strong motivation, with evidence of independent research skills relevant to the project
- Good time management

Desirable attributes:

- Knowledge of stochastic and agent-based models of infectious disease transmission
- Knowledge of machine learning algorithms
- Experience in undertaking independent research
- A completed or near completion MSc in a relevant subject area