

PhD in Pure and Applied Mathematics

Research Title: Statistics in the therapeutics of the virus: vaccine efficacy, clinical trials, surveillance.

SESSION: SUMMER 2021

Funded by	Dipartimento di Scienze Matematiche "Giuseppe Luigi Lagrange"
Supervisor	prof. Mauro Gasparini, E-mail: mauro.gasparini@polito.it
Context of the research activity	These days, vaccines are the most efficient weapon to fight the virus. Like any other new therapies, vaccines undergo the scrutiny of Health Authorities in order to obtain approval. Many clinical trials are then devoted to vaccines and other antiviral therapies and analyzed by a variety of methods centered around Vaccine Efficacy (VE) and several parameters regarding safety and adverse events. The pandemic scenario allows for the prediction that several antivirus therapies will undergo clinical trials at the same time for possibly many years from now, and data will be accumulated and analyzed in various ways.
Objectives	The candidate will study new statistical models and methods, applicable from clinical phase II onwards, to analyze Vaccine Efficacy, to design new methods for clinical trials investigating safety and efficacy of vaccines, to define and design methods to study the therapeutical equivalence or the bioequivalence of more than one vaccine, to explore the possibility to use unsufficiently well designed or unconventional data - such as therapies for which phase II and phase III data are lacking or results from biased treatment assignments. The candidate will work together with people in other disciplines in order to help with the epidemiological and genomic surveillance of the virus and its variants, given the increasing level of population immunity granted by continuous vaccinations.
Skills and competencies for the development of the activity	<ul style="list-style-type: none">- MSc, Laurea or equivalent degree in applied mathematics, statistics, physics, computer engineering, data science or related fields.- at least 15 credits in Probability and Statistics- Good programming skills in R, Python or Matlab- Some basic Bioinformatics is welcome but not strictly necessary.