



# PhD in DATA ANALYTICS AND DECISION SCIENCES - 39th cycle

**THEMATIC Research Field: POPULATION-SCALE MULTI-OMIC DATA IN HEALTH AND DISEASE**

<b>Monthly net income of PhDscholarship (max 36 months)</b>
<b>€ 1400.0</b>
In case of a change of the welfare rates during the three-year period, the amount could be modified.

<b>Context of the research activity</b>	
<b>Motivation and objectives of the research in this field</b>	<p>The development of ever more sophisticated, massively parallel tools to scan the sequence and function of the human genomes has fostered a revolution in our understanding of how inherited genetic variation contributes to human traits and diseases. Over the course of the last 15 years, our group has been at the forefront of studies investigating the genetic control of different layers of biological information, captured through so called multi-omic techniques (eg proteomics, metabolomics, transcriptomics etc). Through integrative analyses anchored on genetic information, we have been able to map the function of many loci predisposing to complex human diseases, and to formulate new therapeutic hypotheses based on genetic data. The student will have access to cutting-edge, multidimensional datasets, including a single-cell transcriptomics dataset in thousands of individuals with linked multiomic and health data information. The main goal of this PhD project will be to deploy advanced analytical approaches based on machine learning and statistical analysis to model the effect of genetic variation on complex biological data and to predict the onset of debilitating human diseases.</p>
<b>Methods and techniques that will be developed and used to carry out the research</b>	<p>Supervised and unsupervised machine learning method application Advanced statistical genetics analyses (Mendelian randomisation, structural equation modelling, heritability partitioning) Advanced genomics techniques (Single-cell genomics, genome sequencing, etc.).</p>



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<b>Educational objectives</b>	The student will learn to design, analyse and interpret studies correlating genetic information to molecular and biomedical traits. The primary objective of this project will be to critically evaluate evidence derived from different types of molecular assays surveying regulation of human genes in different immune cell types, and to be able to critically analyse, model, ask and answer pertinent biological questions to infer causal mechanisms for human diseases. The student will develop skills in statistical data analysis and the application of computation to human genetics research.
<b>Job opportunities</b>	The profile of statistical geneticist researcher and the applications proposed here are broadly relevant for a range of employers including (but not limited to): public and private healthcare institutions, hospitals, clinical and pharmaceutical companies, technology, and biotech companies.
<b>Composition of the research group</b>	1 Full Professors 0 Associated Professors 5 Assistant Professors 4 PhD Students
<b>Name of the research directors</b>	Prof. N. Soranzo and Prof. F. Ieva

<b>Contacts</b>	
<p>Prof. Nicole Soranzo nicole.soranzo@fht.org +393483772301 Soranzo Group - Human Technopole</p> <p>Prof. Francesca Ieva francesca.ieva@polimi.it +390223994578</p>	

<b>Additional support - Financial aid per PhD student per year (gross amount)</b>	
<b>Housing - Foreign Students</b>	--
<b>Housing - Out-of-town residents (more than 80Km out of Milano)</b>	--



Scholarship Increase for a period abroad	
Amount monthly	700.0 €
By number of months	12

**Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information**

List of Universities, Companies, and Institutions cooperating in the research

- Wellcome Sanger Institute
- University of Cambridge
- DFKZ
- HelmHoltz Zentrum Munich

Further support is available for students who engage in activities of teaching or additional lab duties coherent with their academic mission and doctoral training. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.