



PhD in INGEGNERIA DELL'INFORMAZIONE / INFORMATION TECHNOLOGY - 38th cycle

Research Area n. 1 - Computer Science and Engineering

**PARTENARIATO PNRR Research Field: DATA SCIENCE FOR LIFE SCIENCE DATA
MODELING, INTEGRATION AND ANALYSIS**

Monthly net income of PhDscholarship (max 36 months)

€ 1400.0

In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity

Motivation and objectives of the research in this field

A broad quantity and variety of heterogeneous and multi-modal health, clinical, biomedical and biomolecular data is increasingly available in Life Sciences. Their comprehensive analysis through suitable effective algorithms would allow extracting highly relevant information and new biological and biomedical knowledge in diagnosis and clinic areas. The objectives of the research in this field include the development of computational approaches in support of health decision making, including early diagnosis and personalized interventions. The development and application of data science methodologies for data modeling, integration, analysis and knowledge extraction towards disease risk stratification, prediction and prevention in life sciences and medicine is of high interest and key to reach the objectives.

Methods and techniques that will be developed and used to carry out the research

Several types of data science methods and techniques will be considered for the development of novel computational approaches, in particular regarding data cleaning and integration, feature selection, feature engineering, data stratification, and data analysis and classification using different machine learning techniques, especially for prediction and prevention. As far as regards omics data, multiple information engineering and



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| | bioinformatics computational methods for functional genomics and precision medicine will be considered. Multi-omics data analytics as well as genomic, genetic and transcriptional data modelling will also be considered, comprehensively leveraging environmental, behavioral, clinical, health and omics big data available. |
| Educational objectives | We are aimed at developing specific competence, autonomy, research methodology and skills, in an interdisciplinary environment. |
| Job opportunities | Career development is possible both in research, in academic and private institutions, and in production, in industries or private corporations in Italy and abroad. Start-ups from research results are also encouraged. Employment in this area provides several opportunities. |
| Composition of the research group | 0 Full Professors 2 Associated Professors 2 Assistant Professors 3 PhD Students |
| Name of the research directors | Marco Masseroli |

| Contacts |
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| <p>Marco Masseroli, Associate Professor DEIB - Politecnico di Milano tel. +39 02 2399 3553 email marco.masseroli@polimi.it web page link https://www.deib.polimi.it/eng/people/details/266220</p> |

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

| Scholarship Increase for a period abroad | |
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| Amount monthly | 700.0 € |
| By number of months | 6 |

| Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information |
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| This PhD is fully funded within the National Recovery and Resilience Plan (NRRP), Mission 4, |



Component 2 Investment 1.4, funded by the European Union - NextGenerationEU.

Call for Strengthening of research structures and creation of R&D "innovation ecosystems", set up of "territorial leaders in R&D". Specifically, this PhD research is part of the PNRR Innovation Ecosystem "MUSA - Multilayered Urban Sustainability Action?" - Spoke 2: Big Data-Open Data in Life Sciences.

MUSA is a challenging proposal with the ambition to turn Milan Metropolitan Area (MMA) into an ecosystem of innovation for urban regeneration, comprehensive of all levels of intervention, from social to technological, able to scale at the regional and national level and to become a model at the European level. The ecosystem intends to grow on the synergy between Academia, Industry, Local Government Entities and Civil Society.

One of the pillars of the project is the *Big Data-Open Data in Life Sciences*: it will develop an innovative digital platform for fast and secure storage and exchange of big data in life sciences, translate basic research into applications aiming to improve nutritional, healing and environmental conditions of citizens, organize data collection and processing with AI techniques.

LIST OF UNIVERSITIES, COMPANIES, AGENCIES AND/OR NATIONAL OR INTERNATIONAL INSTITUTIONS THAT ARE COOPERATING IN THE RESEARCH: Politecnico di Milano; Università degli Studi di Milano - La Statale; Università degli Studi di Milano - Bicocca

EDUCATIONAL ACTIVITIES (purchase of study books and material, including computers, funding for participation in courses, summer schools, workshops and conferences): financial aid per PhD student

5.707,13 Euro per student

TEACHING ASSISTANTSHIP: (availability of funding in recognition of supporting teaching activities by the PhD student)

There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.

COMPUTER AVAILABILITY: individual use

DESK AVAILABILITY: individual use