



PhD in INGEGNERIA AMBIENTALE E DELLE INFRASTRUTTURE / ENVIRONMENTAL AND INFRASTRUCTURE ENGINEERING - 38th cycle

Research Area n. 3 - Environmental and Hydraulic Engineering and Geomatics

INTERDISCIPLINARY Research Field: GEOAI FOR HEALTH

Monthly net income of PhDscholarship (max 36 months)

€ 1195.0

In case of a change of the welfare rates or of changes of the scholarship minimum amount from the Ministry of University and Research, during the three-year period, the amount could be modified.

Context of the research activity

Motivation and objectives of the research in this field

Interdisciplinary PhD Grant

The PhD research will be carried out in collaboration with research groups of the PhD programme in "**DATA ANALYTICS AND DECISION SCIENCES**".

See <https://www.dottorato.polimi.it/?id=422&L=1> for further information.

The synergy between Geomatics / Earth Observation (GEO) and Artificial Intelligence (AI) has recently given birth to the new research area of GEOAI. Within this, an emerging role is that of GEOAI for health, since the space-time contextualization plays an important role both in the study of population health (environmental health, epidemiology, genetics, social and behavioural sciences and infectious diseases) and individual health (precision medicine and disease management based on genetic, environmental and lifestyle variability). The inclusion of location-based information allows for a better understanding of risk factors for diseases and the identification of new targets to prevent diseases or increase resilience towards them. GEOAI allows, thanks to the combination of geospatial and time-varying big data (including data from ground and satellite sensors) and the methods adopted in space sciences (GIS), AI, data mining and high-performance computing, to extract a deeper



	<p>knowledge of the phenomena related to human health, as well as the animal and plant world.</p>
<p>Methods and techniques that will be developed and used to carry out the research</p>	<p>The innovative and motivating aspect of the research is the use of geospatial and time-varying data, derived from sensors that allow a space-time contextualization and / or from demographic / socio-economic statistical data, and data relating to human health.</p> <p>The interdisciplinary contribution is required to combine the two elements:</p> <ol style="list-style-type: none"> 1. Collection, pre-processing and processing of geospatial data (experience of the geomatics group - GISGEOlab, prof. Brovelli, DICA), 2. collection, pre-processing and processing of data relating to the health of populations and individuals (experience of the bioengineering group for prevention - TakeCare Lab, prof. Caiani, DEIB). <p>The data in (1) may concern, for example, surveys of environmental and pollution factors, as well as of mobility, starting from suitable accessible databases.</p> <p>The data in (2) may include open access information on demographic characteristics and access to certain health services in each territory, as well as geo-localized events related to transmissible and non-transmissible diseases.</p> <p>Starting from the techniques of geomatic representation of data (QGIS), analysis methods based on machine learning will be applied to the selected scenarios for the identification and quantification of health risk factors, thus providing risk maps for the territory considered. Starting from these maps, decision support algorithms will be developed, to simulate corrective actions aimed at reducing these risks, and thus support the possible political decision maker.</p>
<p>Educational objectives</p>	<p>The PhD programme in Environmental and Infrastructure Engineering introduces national and international PhD candidates to the research on theoretical and technological key topics related to water, the environment, infrastructures, geology and geomatics; characterized by a strong cross-sectoral and multi-sectoral approach (see https://www11.ceda.polimi.it/manifestidott/manifestidott/co</p>



	<p>ntroller/MainPublic.do?check_params=1&k_corso_la=1378&lang=IT&__pj0=0&__pj1=9dbe03d420915b40ffa2f22f8db615c8 for further information).</p>
Job opportunities	<p>Typical job opportunities include working at universities, research centres, public bodies, and authorities, as well as private companies/industry. Small and medium-sized enterprises (SMEs) may also require highly professional profiles to ensure critical innovation and competitiveness. A PhD in Environmental and Infrastructure Engineering can provide highly qualified personnel for key positions and roles in research centres, top management in Public Authorities and Authorities involved in environmental policy, and senior consultants for engineering companies (national and international).</p>
Composition of the research group	<p>1 Full Professors 3 Associated Professors 2 Assistant Professors 8 PhD Students</p>
Name of the research directors	<p>Maria Antonia Brovelli, Enrico Gianluca Caiani</p>

Contacts	
<p>maria.brovelli@polimi.it 02.2399.6242 https://www.gisgeolab.polimi.it/</p>	<p>enrico.caiani@polimi.it 02.2399.3390 https://www.deib.polimi.it/ita/personale/dettagli/116778</p>

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

Scholarship Increase for a period abroad	
Amount monthly	597.50 €
By number of months	6



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

List of Universities, Companies, Agencies and/or National or International Institutions that are cooperating in the research

University of Padua
Italian Institute for Environmental Protection and Research
Agenzia Regionale Emergenza Urgenza
Lombardy Agency for the Protection of the Environment
University of Geneva
UN-GGIM
EBWorld
National Research Council

Educational activities (purchase of study books and material, funding for participation to courses, summer schools, workshops and conferences): financial aid per PhD student per year: max 1624.30 euros per student on average.

Teaching assistantship (availability of funding in recognition of support to 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 and desk availability: 1st year + 2nd year + 3rd year: individual use.