POLITECNICO DI MILANO

PhD in INGEGNERIA AMBIENTALE E DELLE INFRASTRUTTURE / ENVIRONMENTAL AND INFRASTRUCTURE ENGINEERING - 41st cycle

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

Number of scholarship offered	2
Department	DIPARTIMENTO DI INGEGNERIA CIVILE E AMBIENTALE

Description of the Research Area

This Area main topics are:

Environmental Engineering: 1. Water supply technology and treatment, disposal and reuse of wastewater, advanced biological and physical-chemical water and wastewater treatment; sludge management and disposal; anaerobic digestion processes. 2. Management and planning of environmental resources: source apportionment of pollutant loads; water quality modelling, scenario analysis and knowledge-based decision support systems of management alternatives. 3. Solid wastes and sludge minimization and management. 4. Phenomenology of atmospheric environment and treatment of gaseous emissions. 5. Contaminated soil, sediment and groundwater: characterization, risk assessment, in-situ and on site remediation technologies.

Hydraulic Engineering: main research areas are as follows 1. Fluid mechanics: advanced methodologies of computational and experimental fluid dynamics, modeling of processes of fluid-structure interactions for environmental, civil and industrial engineering applications, hydraulic measurement techniques, computational fluid dynamics of complex flows. 2. River hydraulics and sediment mechanics: modeling of free surface flows, local and general scour processes, hyper-concentrated flows, flooding and hydraulic risk quantification and management. 3. Flow and transport processes in porous systems: characterization of hydraulic properties from pore- to aquifer system- scales; well testing; inverse modeling / history matching / data assimilation; flow and multicomponent reactive transport process in heterogeneous media under uncertainty and probabilistic risk quantification; multiphase flows, including oil and gas reservoir engineering; scaling of hydrogeological quantities; mixing processes in coastal aquifers; geothermal fluxes at the reservoir and basin scales; enhanced oil recovery. 4. Hydraulic networks and energy harvesting from fluid flows, including innovative technologies for monitoring and optimization of water distribution systems.

Geomatics: disciplines dealing with positioning, global and local reference system establishment, surface surveying and reconstruction from a global scale down to the individual architectural manufact scale, representing data via graphical or virtual tools, archiving and cross-referencing spatial data in geographic information systems.Education and research topics include: Physical and satellite geodesy, including gravity field estimation and geophysical interpretation; Positioning, deformation estimation and navigation using classical and satellite methods (e.g., GPS); Surface surveying with optical or other sensors (SAR, LIDAR, etc.) across different scales; Digital photogrammetry and image analysis, including software for surface reconstruction and feature extraction; Remote sensing, using spectral analysis to identify geographic information; Geographic information systems, with advanced tech for internet and mobile GIS; Cultural heritage reconstruction and archiving, integrating diverse data into 3D virtual models with full geometric and metric info.

POLITECNICO DI MILANO

PhD in INGEGNERIA AMBIENTALE E DELLE INFRASTRUTTURE / ENVIRONMENTAL AND INFRASTRUCTURE ENGINEERING - 41st cycle

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

OPEN SUBJECT Research Field: ENVIRONMENTAL AND HYDRAULIC ENGINEERING AND GEOMATICS

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	Key research areas are keyed to environmental, civil and industrial engineering applications and include: - Air/Soil/Water quality management and treatment/remediation technologies; - Waste management; - Environmental impact, risk assessment and management; - Computational and experimental fluid dynamics; - River hydraulic and sediments mechanics, flooding; - Flow and transport processes in porous systems; - Theoretical and mathematical geodesy; - Statistical data analysis and management; - Remote sensing, satellite positioning, surveying technologies, geographic information systems.
Methods and techniques that will be developed and used to carry out the research	Research is performed upon integrating (a) methodological and basic theoretical aspects, (b) field- and laboratory-based experiments/observations, and (c) conceptual and numerical model development and implementation strategies within a unified framework.
Educational objectives	The main objective is the education of professionals and scientists who can design and develop autonomous

	research plans and activities with critical expertise in environmental and hydraulic engineering and geomatics.
Job opportunities	Main opportunities in the job market include Universities, Research Centers, top level management in Authorities involved in environmental policy, senior consultants for engineering companies, high level personnel for the industry, instruments and geographic information management.
Composition of the research group	10 Full Professors 14 Associated Professors 12 Assistant Professors 25 PhD Students
Name of the research directors	R. Canziani-G.V. Messa-G. Venuti

Contacts
roberto.canziani@polimi.it (Ph: +39-02-2399-6410) gianandreavittorio.messa@polimi.it (Ph. +39-02-2399-6287) giovanna.venuti@polimi.it (Ph: +39-02-2399-6524)

Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents	--

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

Stage and period abroad	
Institution or company where the candidate will spend the period abroad (name and brief description)	
By number of months abroad	0

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

1766.75 euros per student on average.

Teaching assistanship (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.