



PhD in INGEGNERIA STRUTTURALE, SISMICA, GEOTECNICA / STRUCTURAL SEISMIC AND GEOTECHNICAL ENGINEERING - 38th cycle

**INTERDISCIPLINARY Research Field: NUMERICAL AND EXPERIMENTAL STUDY ON
TOPPLING RESISTANCE OF TREES IN URBAN AREAS AND OF THEIR EFFECTS AS
SUSTAINABLE DRAINAGE SYSTEMS FOR FLOODING CONTROL**

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 **"ENVIRONMENTAL AND INFRASTRUCTURE ENGINEERING"**.

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

The thesis deals with the study of a complex soil-structure interaction problem, where the tree is considered as a "living" structure, whose foundation is subject to complex environmental loads (e.g. intense wind gusts) in a variable environmental conditions (e.g., related to cumulated rainfall events). This is mainly important in urban areas, where sudden tree crashes due to toppling may induce severe damages to people and goods. More, even considering climate change, trees can significantly influence the managing of stormwaters, acting as sustainable drainage systems.

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

Both numerical and experimental techniques will be employed, working on small scale laboratory prototypes and (when applicable) on real scale trees, to also evaluate the influence of different pavements installed at the basis



	of urban trees on their stability and reliability as sustainable drainage systems.
Educational objectives	The PhD candidate will learn advanced Soil Mechanics concepts regarding both numerical and experimental activities. Particular importance will be devoted to the constitutive modelling at several scales of application (representative elementary soil volume; single root; entire root plate; ...), and to the interpretation of numerical and experimental results at the global scale of the root plate, taking into account the effects of water infiltration on the mechanical response of the system and on urban flood control. The candidate will take part in National and International scientific collaborations, and in the writing of the relative scientific internal reports and papers for the results dissemination.
Job opportunities	The candidate will have the opportunity to send applications for permanent positions both at Academic and Professional levels (the interest in this topic is rapidly increasing, both in the national and in the international community).
Composition of the research group	0 Full Professors 1 Associated Professors 1 Assistant Professors 0 PhD Students
Name of the research directors	Andrea Galli, Anita Raimondi

Contacts	
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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

The project is a part of Scientific Agreements of Politecnico di Milano (polo Territoriale di Lecco), Università degli Studi di Milano-Bicocca, University of Dundee (UK), the company Agroservice, Instituto de Pesquisa Tecnológicas do Estado de São Paulo S.A. (IPT), Secretaria Municipal do Verde e do Meio Ambiente de São Paulo (SVMA), Pozzoli Depurazione srl.

Educational activities

The Ph.D. course supports the educational activities of its Ph.D. students with an additional funding equal to 10% of the scholarship, starting from the first year.

Teaching assistanship

Ph.D. students are encouraged to apply upon prior authorization to the calls to support teaching activities at the undergraduate and Master levels at Politecnico, and they are paid for that. Teaching assistantship will be limited up to about 80 hours, maximum half of them devoted to teaching and classroom activities and the rest to support classworks and exams.

Computer availability

Each Ph.D. student has his/her own computer for individual use.

Desk availability

Each Ph.D. student has his/her own desk, cabinet and locker.