ESR 4.5 - Evaluation of the systemic vulnerability and risk of interconnected systems at urban, sub-urban, and industrial scales

A Research PhD position in the URBASIS ITN funded by the EC

Supervisor – Kyriazis Pitilakis (AUTH –Thessaloniki) – Chiara Smerzini (POLIMI - Milano)

Recent devastating earthquakes and induced seismicity near infrastructures must become the centerpiece of analysis in reducing risk and increasing resilience, facing up to global urban population growth in the coming decades and the concentration of wealth in cities. The prediction of seismic ground motion and response of structures are key issues in reduction of seismic urban risk. There is therefore a demand for highly trained scientists with a broad understanding of engineering seismology and earthquake engineering, skills being essential in academic research, in private companies with activities related to risk mitigation and energy facilities and for policy makers. The URBASIS-EU project aims to provide a multi-disciplinary training platform for young scientists in order to develop their individual project and to promote their entrepreneurship and their employability toward the academic, private and insurance or decision-making sector. High-quality supervision of the young scientists will be ensured through the international recognition of the URBASIS-EU partners. A comprehensive set of transferable skills will be developed through innovative and interdisciplinary joint research projects between academic and non-academic partners on the prediction of seismic hazard in urban areas considering low-probability/high-consequences events and induced seismicity related to the exploitation of energy resources; the seismic ground motion prediction within the non-free-field urban area; the coupling between ground motion and structures/infrastructures responses for natural and induced seismicity including time dependent vulnerability; and the systemic risk of interconnected urban systems. URBASIS-EU will create a lasting collaboration for the establishment of a European network of academic and non-academic experts, improving the interface with decision-makers.

More information: https://urbasis-eu.osug.fr/?lang=en

Job description

The synergies between components within the same system (intra-dependencies) or between different systems (inter-dependencies) can affect seriously the total seismic losses at the urban, sub-urban, and industrial scales. Therefore, it is essential to define the taxonomy of interacting systems and components, and to evaluate the overall losses and impacts of an earthquake event or/and consequent seismic events, based on a systemic approach that accounts for the time independent or time dependent hazard variability, the vulnerability assessment of components and systems, and the interactions between the multiple component systems, within efficient quantitative modeling. The project aims to develop a probabilistic systemic approach for the vulnerability and risk assessment of systems and infrastructure at urban, sub-urban, and industrial scales, built upon previous knowledge and tools, which will be further extended and improved.

The ESR will propose innovative methods and computational tools to take into account the time dependent or/and independent vulnerability of interconnected systems at urban, sub-urban, and industrial areas, appropriate to estimate global damage and losses. The ESR will apply these tools to

the city of Thessaloniki in Greece and its infrastructure, to test and validate the developed methods and computational schemes. The impact on spatial correlations models of ground motion on risk estimates will be also assessed.

The URBASIS consortium is funded by European Commission's Innovative Training Network (ITN) program. This research project will take place at the University of Thessaloniki, Greece. This project will involve close collaboration with Politecnico di Milano (Italy), where the researcher will spend several months. The project will also involve secondment with an industrial partner (RESONANCE Ingénieur Conseil, Geneva).

Requirements and Application

The successful applicant must have a Master degree in Civil Engineering, earthquake engineering and engineering seismology or similar. The applicant is expected to have a very strong civil and earthquake engineering background. Furthermore, knowledge of code programming is an advantage. Excellent undergraduate and Master degree grades are expected. A high level of written and spoken English is also expected.

PhD stipends are allocated to individuals who hold a Master's degree. PhD stipends are normally for a period of 3 years. It is a prerequisite for allocation of the stipend that the candidate will be enrolled as a PhD student at the Doctoral program of the Department of Civil Engineering of Aristotle University of Thessaloniki, in accordance with the regulations of the PhD Program at the University. According to the URBASIS-EU, the progress of the PhD student shall be assessed every 12 months. It is a prerequisite for continuation of salary payment that the previous progress is approved at the time of the evaluation.

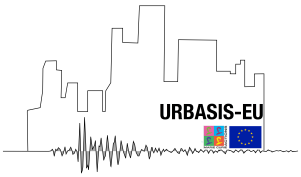
The qualifications of the applicant will be assessed by the Selection committee. On the basis of the recommendation of the Selection committee, the Director of the Doctoral School of Aristotle University of Thessaloniki will make the final decision for allocating the stipend.

URBASIS-EU wishes to reflect the diversity of society and welcomes applications from all qualified candidates regardless of personal background or belief. We encourage applications from everyone irrespective of gender and ethnic group but, as women and members of ethnic minority groups are currently under-represented at this level of post, we would encourage applications from members of these groups. Appointment will be based on merit alone.

Application must be in a form of a single PDF file including a CV, a cover letter, academic transcripts, and the names and complete contact information and letter of two referees sent through :

- **the consortium web-page https://urbasis-eu.osug.fr/?lang=en**
- **the EU EURAXESS portal https://euraxess.ec.europa.eu/**

Vacancy number : URBASIS-EU ESR4.5 (to be reminded in the application form)
Deadline : February, 23rd 2019
Salary : According to the European Commission and local standards ; minimum gross wage is 3500 euros before local taxes



Contact Information

You may obtain further information from :

- **Philippe Guéguen,** URBASIS project coordinator **:** philippe.gueguen@univ-grenoble-alpes.fr (Earth Science Institute, Université Grenoble Alpes) for general questions regarding the URBASIS consortium, concerning the scientific and training aspects of the ITN program.
- **Kyriazis Pitilakis** : kpitilak@civil.auth.gr (AUTH) concerning the scientific aspects of this PhD project.
- **Florence Cataye**, URBASIS project manager : florence.cataye@univ-grenoble-alpes.fr for administrative questions.