

## **PhD Course in Earthquake and Environmental Hazards** **- EEH at Scuola Superiore Ud'A**

### **Introduction**

Earthquake and Environmental Hazard (EEH) is a PhD course dedicated to high-quality studies and original research on natural and anthropogenic hazards and their consequences. It is aimed to build a multi-task research community concerned, on one side, with monitoring, modelling and assessment of hazards and, on the other, with the investigation of the impact on individuals and society, finalized to the design and implementation of risk mitigation and adaptation strategies. The skills of the EEH teaching board, which span from Earth Sciences and Physics (ERC PE10) to Archeology and Psychology (ERC SH4), make possible a multi-task approach to two high-impact categories of hazard, earthquakes and environmental pollution.

1. **Seismotectonics and seismogenesis for seismic hazard assessment**
2. **Environmental pollution monitoring and analysis for hazard assessment**
3. **Psycho-sociological analysis of hazard perception and risk communication.**

EEH students will develop and implement their scientific background, but, at the same time, they will acquire basic tools and knowledge on hazard problems approached from different point of views. This strategy is crucial to educate and train a new generation of researchers and technicians able to combine their specific expertise into a common procedure for successful risk management. Such a framing process is urgent in order to increase resilience to earthquakes and environmental hazards and to reduce the impact from natural disasters.

The course is open to candidates with a master degree in structural geology, geophysics, geomorphology, seismology, archaeology, geochemistry, petrography, physics, environmental science, psychology and sociology. Accordingly, candidates will widen their specific competence by working in a team of experts from many different fields.

### **To apply:**

<https://www.scuolasuperiore.unich.it/bandi/bando-di-concorso-lammissione-al-dottorato-di-ricerca-xxxiii-ciclo-aa-20172018>

### **General information and contacts:**

SCUOLA SUPERIORE G. D'ANNUNZIO

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## EEH characterizing topics:

<b>Seismotectonics and Seismic Hazard</b>	<p><i>Research and teaching activities include</i></p> <p>geology and physics of earthquakes, seismotectonics and seismogenesis. The study will be performed at a local and regional scale, in Italy and elsewhere in the world, with the aim to study and to define the 3D geometry, kinematics and dynamics of selected active faults systems, from the source to the surface. The relationships between tectonic structures and instrumental to pre-historic earthquakes will be deeply analysed from the geological, archaeological, and seismological side for a better understanding and modelling of the complex processes controlling active faulting and earthquake mechanics. The research will be afforded in a long-term geologic perspective, considering the earthquakes as instantaneous deformation of longer term deformation histories. Territorial applications in the form of seismic hazard analysis will be afforded.</p> <p>Basic disciplines are Structural Geology, Geomorphology, Solid Earth Geophysics, Seismology and Archeology.</p> <p><i>Contact: prof. Giusy Lavecchia, glavecchia@unich.it</i></p>
<b>Environmental Pollution and Hazard</b>	<p><i>Research and teaching activities include:</i></p> <p>the analysis of the role of anthropogenic and natural emissions on the degradation of water and air quality. Multi-disciplinary analytical investigations will be carried out to assess the impacts of the atmospheric, soil and water composition changes on climate, ecosystems and well-being. Crustal gas emission associated with earthquake activity will be also analyzed. The exchanges processes among air, soil and ocean are other key topics for a global picture of the environmental hazard.</p> <p>Basic disciplines are Physics of the Earth and Atmosphere, Geochemistry/Petrology and Plant Ecosystems.</p> <p><i>Contact: prof. Piero di Carlo (piero.dicarlo@unich.it)</i></p>
<b>Psycho-sociological analysis of hazard perception and risk communication</b>	<p><i>Research and teaching activities include:</i></p> <p>psycho-sociological analysis of risk perception and communication, with a focus on earthquakes and environmental disasters.</p> <p>The analysis will be performed looking at the individual cognitive process and at the social representations of the different physical process; risk-related health and well-being in complex contexts will be also addressed. The full psycho-sociologic understanding of a system, community or society exposed to natural hazards cannot be achieved without the deep interaction between the psychologists and the scientists who study the specific physical phenomena. Such an interaction is one of the EEH strength and it is aimed to the building of successful risk mitigation and adaptation strategies.</p> <p><i>Contact: prof. Nicola Mammarella (n.mammarella@unich.it)</i></p>

## **Board of Professors**

### ***Seismotectonics and Seismic Hazard***

Giusy Lavecchia	full professor of Structural Geology, Ud'A , PhD Coordinator
Francesco Brozzetti	associate professor of Structural Geology, Ud'A
Paolo Boncio	associate professor of Structural Geology, Ud'A
Bruno Pace	researcher in Solid Earth Geophysics, Ud'A
Rita de Nardis	researcher in Seismology, Ud'A
Oliva Menozzi	researcher in Archaeology Ud'A
Ramon Arrowsmith	full professor of Geomorphology, Arizona State University USA
Mauro Cardinali	researcher in Geomorphology, CNR

### ***Environmental Pollution and Hazard***

Francesco Stoppa	full professor of Geochemistry and Petrology, Ud'A
Piero di Carlo	researcher in Physics of the Earth and the Atmosphere, Ud'A
Giacomo Gerosa	associate Prof. in Physics of the Earth and the Atmosphere, UNICATT
Roderic Jones	full professor in Physics of the Atmosphere, Univ. Cambridge, UK
William Brune	full Professor in Physics of the Atmosphere, PennState Univ., USA
Paolo Bonasoni	researcher in Physics of the Earth and the Atmosphere, CNR
Paolo Cristofanelli	researcher in Physics of the Earth and the Atmosphere, CNR
Elena Paoletti	researcher in Physics of the Earth and the Atmosphere, CNR

### ***Psycho-sociological analysis of Hazard Perception and Risk Communication***

Nicola Mammarella	associate professor in General Psychology, Ud'A
Chiara Berti	associate professor in Social Psychology, Ud'A
Michela Cortini	associate professor in Work and Organizational Psychology, Ud'A
Maria Cristina Verrocchio	associate professor in Clinical Psychology, Ud'A
Di Domenico Alberto	researcher in General Psychology, Ud'A

## **PhD Lectures:**

The EEH PhD course offers to each student 160 hours of interdisciplinary lectures organized as follows:

- 80 hours of lectures, common to all first-year students, on various aspects of natural hazard, risk and their communication;
- 80 hours of highly-specialized thematic lectures to second and third-year students, for each one of the three characterizing topics.

## ***EEH students duties***

The PhD students must follow at least 80% of the first-year lectures and at least 70 % of the second-year ones. They may follow the lectures of the third year elsewhere, upon agreement of their tutors.

During the three years, the PhD students must attend at least three national or international conference meetings as co-authors of oral presentations or posters; at least in one case, they will have to be first author. At the completion of the third year, to be published or submission to print of at least one paper on an ISI magazine is required, unless exceptional specific exemptions is provided by one of the member of the Board of Professors.

A minimum of 90 days abroad, even non-consecutive, is strictly foreseen for every PhD student at EEH.

## ***More details on PhD lectures***

PhD students at EEH must attend lectures for a total of thirty formative credits (CFUs), in three years. One credit stays for 8 hours of lectures. The lectures will be organized in frontal lessons, laboratories, field activities, workshops and seminars.

Twenty credits are given by the EEH board of Professors, the other ten credits are given at EEH by invited teachers and/or may be acquired by the PhD students elsewhere. The lectures given by the EEH board of Professors are subdivided into :

- ten credits common to all the first-year students
- ten credits for each of the three major EEH research topics (Earthquake, Environment, Risk Reduction) during the second and third year students.

The first-year lectures are aimed to give a common background on the aspects of hazard, risk and communication to all students. Starting from this academic year, the ten credits will be organized as follows:

16 hours - Building a common glossary on earthquakes, faults, environment, global change, ecosystems, hazard and risk

16 hours- Learning to use GIS tools for common geographic reference frame and map view representations

8 hours - Introduction to statistics and data analysis

8 hours - Introduction to structural geology, seismology and seismotectonics

8 hours - Introduction to physics and geochemistry: soil, water and air pollution

8 hours - Introduction to social psychology, communication strategy

8 hours - Vulnerability of cultural heritage; territory governance and legal aspects.

8 hours - One day field trip to the Mt. Vettore seismogenic faults, with geologic and soil flux observation

By attending side by side these lectures, geologists, geophysicists, geochemists, archeologists, physicians and psychologists at EEH can spend time together and share knowledge and projects starting to acquire a common ethics to approach hazard.