TITOLO DEL CORSO: NATURAL HAZARD FORECASTING			
Settore Scientifico - Disciplinare: GEO/10	**CFU: 6** (5 LF + 1 LAB)		**Ore:** 52
Ore di studio per attività:	**Lezioni frontali:** 2	**Laboratorio:** 1	**Attività di campo:** 0
Tipologia di attività formativa: Affine e integrativo			

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SYLLABUS

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Prerequisiti: Mathematics, Physics, and Geophysics

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Lezioni frontali

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numero di ore 5	<u>Topic:</u> <u>Introducing natural hazard forecasting</u> Natural hazard forecasting as a scientific enterprise; predictions and forecasts; probabilistic, stochastic and deterministic modeling; the hazard/risk separation principle.
numero di ore 10	<u>Topic:</u> <u>Probabilistic methods for natural hazard forecasting</u> The nature of uncertainties; uncertainty and probability; the role of subjectivity and objectivity in forecasting models; the Bayesian and the unified probabilistic frameworks; ensemble modeling.
numero di ore 9	<u>Topic:</u> <u>Testing natural hazard forecasts</u> Basic principles on testing and model validation; consistency and comparative tests; prospective and retrospective tests.
numero di ore 10	<u>Topic:</u> <u>Natural hazard forecasting in the real world</u> Principles of short- and long-term seismic hazard forecasting; principles of short- and long-term volcanic hazard forecasting; examples from tsunami, atmospheric events, landslides.
numero di ore 6	<u>Topic:</u> <u>Multi-hazard and multi-risk</u> The bottom-up view of multi-hazard and risk; the interaction of different natural hazards and risks; the cascading effect; managing quantitatively the multi-hazard/risk.

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Laboratorio

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numero di ore 12	<u>Topics developed in **MATLAB**:</u> Implementing operational earthquake forecasting at worldwide scale; building a basic seismic hazard model for Italy; short-term eruption forecasting at Neapolitan volcanoes; building a long-term volcanic hazard for Vesuvius.

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Risultati di apprendimento attesi

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Knowledge and understanding:
The student must have basic knowledge of mathematics, physics applied to the Earth system, and programming.

Applying knowledge and understanding:
The student must be able to apply the knowledge acquired to estimate the hazard posed by natural threats, including the capability to write basic numerical codes for this purpose. Moreover, the student must be able to understand how hazard forecasting can be used to assess and reduce a wide range of risks for different stakeholders.

Making judgments:
The student must be able to choose autonomously the most appropriate framework to analyze the natural hazard in different situations and to estimate all kind of uncertainties, as well as to understand her/his role in the full risk reduction strategy.

Communication:
The student must be able to explain to experts the outcomes of natural hazard forecasting, including the quantification of the uncertainties. S/he must also be able to engage laymen in understanding natural hazards, and the limits of our predictability.

Learning skills:
The student must be able to broaden autonomously her/his knowledge and skill on natural hazard forecasting, reading the most advanced literature on this field, and s/he must be able to deepen the specific problems related to one specific kind of hazard.

Modalità di verifica dell'apprendimento

Esame finale:
Oral exam.