Program

Lecture 1

Basics concepts of magnitude, ground motion intensity measures and source-to-site distance metrics. Introduction to PSHA: source models (seismogenic zones and faults), earthquake catalogs, completeness intervals, occurrence rates, Gutengerg-Richter law; ground motion prediction models.

Exercise: starting from mainshock catalog, calculation of earthquake rates and parameters of the Gutenberg-Richter law.

Lecture 2

Homogenous Poisson process and seismic hazard integral; uniform hazard spectrum; disaggregation of seismic hazard conditional to the exceedance of a ground motion intensity measure threshold (in terms of magnitude and distance and magnitude, distance and standard residual); peak over the threshold; logic tree.

Exercise: PSHA implementation considering one seismogenic zone.

Lecture 3

Correlation of ground motion model residuals: correlation structure of spectral accelerations at one site, conditional mean spectrum and conditional spectrum, conditional hazard. Disaggregation of seismic hazard conditional to the occurrence of a ground motion intensity measure threshold.

Exercise: calculation of conditional spectrum.

Lecture 4

Non-homogeneous Poisson process, aftershock probabilistic seismic hazard analysis (APSHA) and sequence-based probabilistic seismic hazard analysis (SPSHA).

Exercise: APSHA and SPSHA numerical application.

Lecture 5

Multi-site probabilistic seismic hazard analysis: gaussian random fields, spatial correlation of the same spectral acceleration at different sites and spatial-cross correlation of different spectral accelerations at multiple sites, simulation of ground motion intensity measure realizations at more than one site in multiple earthquakes.

Exercise: simulation of ground motion intensity measures in a time interval at more than one site.