Module Nr.	Credits	Workload	Semester	Frequency	Duration
SE-CO-16	6 CP	180 h	3	Yearly (WS)	1 Semester
Courses			**Contact time**	**Self-study**	**Group size**
Seismotectonics and Seismic Hazard			4 h/week	120 h	---

Seismotectonics and Seismic Hazard

Learning outcomes

A multidisciplinary approach is strongly needed in order to better understand the seismic potential of any region in the world. Geological data give us a long-term (thousands of years) view of earthquake phenomena, but they are limited to the first meters of the crust. Seismological and geophysical data can generally better describe deformation processes occurring at depth, but usually with a smaller temporal (tens of years) and spatial resolution. This course will provide an introduction to the earthquake problem from both geological and geophysical points of view, with emphasis on the methodologies commonly used to produce the data necessary to understand and quantify the seismic hazard in any active region.

After successful completion of the module, students will be able to

- Understand the relationship between lithosphere rheology and earthquake distribution;
- Understand the relationship between frictional properties and faulting;
- Understand the basics of earthquake detection and location;
- Understand the relationship among subsequent earthquakes (earthquake and fault interactions);
- Understand the primary (faulting) and secondary (liquefaction, landslides, etc.) effects produced by seismic events;
- Understand the basics of Tectonic Geodesy;
- Understand the basics of Tectonic Geomorphology;
- Understand the basics of Paleoseismology;
- Understand the basics of probabilistic and deterministic seismic hazard calculations.

Content

Topics included in the course are: Rheology of the lithosphere, frictional properties of faults, the seismic cycle, earthquake location, geological effects of earthquakes, tectonic geodesy, tectonic geomorphology, paleoseismology, earthquake and fault interactions, probabilistic and deterministic seismic hazard.

In addition to theoretical information presented via lecture material, the practical exercises teach fundamental data analysis via MATLAB, and other software distributed during the course.

Teaching Methods / Language

Lecture period of 2 h/week with practical exercises of 2 h/week. Exercises are completed primarily in digital format (basic programming in Matlab). / English

Mode of assessment

Final written exam (2h)

Requirements for the award of credit points

Exercises must be completed (evaluated written reports) with a passing grade of 60% in order to access the final exam. Pass the final exam.

The module grade is based on the final exam grade.
Module applicability (in other study programs) Master Geosciences
Weight of the mark for the final score 5 %
Module coordinator and lecturer Prof. Dr. Rebecca Harrington (coordinator), Dr. Alessandro Verdecchia
Further information Students must have successfully completed a BSc in the earth sciences. The course consists of exercises as well as lecture, and exercises must be completed with a passing grade (60%) to access to the final exam on which the module grade will be based. The course will take place in English, therefore effective oral and written communication skills in English are required. *Literature:* **Structural Geology**, Haakon Fossen, Cambridge University Press, 2013. **The Geology of Earthquakes**, R. S. Yeats, K. Sieh and C. R. Allen, Oxford University Press, 1997. **The Mechanics of Earthquakes and Faulting**, C. H. Scholz, Cambridge University Press, 2012. **Paleoseismology**, J. P. McCalpin, Academic Press, 2nd Ed.