

Week	Day	Date	Lecture	Content
1	1	Mon. 1.4.2019 (9.00-12.00)	Introduction	Goals of the course and schedule; Introduction to earthquakes; Brief history of seismology; Seismic hazard and risk
			Seismotectonics	Global seismicity distribution ; Structure of the earth; Plate tectonics; Type of plate boundaries; Seismogenic faults and their representation; Stress accumulation and elastic rebound theory
	2	Tue. 2.4.2019 (9.00-12.00)	Elastostatic	Review on vector calculus; Deformation, stress and strain; Generalized Hooke law; Elastic moduli
			Elastodynamic	Differential wave equations; Helmholtz potentials; P and S wave solutions
	3	Wed. 3.4.2019 (9.00-12.00)	Wave and media	Ray parameter, slowness; P, SH, SV polarisation; Reflection and transmission coefficients; Snell's law; Critical angle
	4	Thu. 4.4.2019 (9.00-12.00)	Surface waves	Evanescent waves; Eigenvalue problem for Rayleigh and Love; waves; Velocity dispersion and polarization
			Attenuation	Intrinsic attenuation; Wave solution using complex velocities; Geometrical spreading; Scattering
	5	Fri. 5.4.2019 (9.00-12.00)	The seismic source	Point source and Green tensor; Extended source: double couple solution; Moment tensor; Radiation pattern; Focal mechanism. Beach-ball representation; The far-field Brune's spectral model
Earthquake location			Introduction to inverse problems in geophysics; Epicentral and hypocentral location solution; P-S travel-time delay; Triangulation	

Week	Day	Date	Lecture	Content
2	1	Mon. 8.4.2019 (9.00-12.00)	Exercises with T.A. Revision / Questions	
	2	Tue. 9.4.2019 (9.00-12.00)	Size of earthquakes	Macroseismic intensity scales; Peak ground estimates: PGD, PGV, PGA; Response and pseudo-response spectrum; Magnitude scales: M_L , M_s , m_b , M_d ; Earthquake energy, scalar moment and moment magnitude M_w
	3	Wed. 10.4.2019 (9.00-12.00)	Seismic occurrence analysis	Earthquakes catalogues; Poisson assumption. Magnitude of completeness; Magnitude frequency distributions; The characteristic earthquake model; Occurrence from geology and geodesy; Aftershocks, Omori's law; Catalogue declustering; Short-term forecasting: precursors and seismic gap theory
	4	Thu. 11.4.2019 (9.00-12.00)	Ground motion prediction equations	Source, path and site term; Regional and global strong motion datasets; Empirical and physics based models; Data fitting; Uncertainty and sigma
	5	Fri. 12.4.2019 (9.00-12.00)	Deterministic seismic hazard assessment	The worst case scenario; Numerical and empirical modelling approaches.
			Probabilistic seismic hazard assessment	Probabilistic vs. deterministic approach; Source models: distributed seismicity and finite fault models; Scaling relations; Maximum magnitude; Review of probability; Hazard integral; Probability of exceedance; hazard curves; Uniform hazard spectra; Logic trees and epistemic uncertainty; Seismic hazard disaggregation

Week	Day	Date	Lecture	Content
3	1	Mon. 15.4.2019 (9.00-12.00)	Exercises with T.A. Revision / Questions	
	2	Tue. 16.4.2019 (9.00-12.00)	Site effects and microzonation	Seismic impedance amplification; Seismic resonance; The analytical soil transfer function; Topographic and 2D/3D geometric effects; Non-linear soil behaviour, liquefaction and cyclic mobility; Examples of microzonation studies; Soil classification, proxies; National regulations and building codes
	3	Wed. 17.4.2019 (9.00-12.00)	Seismometry	Seismometers and instrument response; Seismic networks; Early warning systems
			Principle of digital signal processing	Time series analysis; Digital representation: quantization and sampling; Fourier analysis; Correlation, convolution, filtering
	4	Thu. 18.4.2019 (9.00-12.00)	Exercises with T.A. Revision / Questions	

Week	Day	Date	Lecture	Content
4	1	Mon. 29.4.2019 (9.00-12.00)	Seismic exploration and site characterisation	Reflection and refraction seismic; Tomography; Surface wave analysis; Ambient vibration techniques
	2	Tue. 30.4.2019 (9.00-12.00)	Invited Seminars Open discussion	
	3	Thu. 2.5.2019 (9.00-12.00)	Personal project presentation	
	4	Fri. 3.5.2019 (9.00-12.00)	Exam	