Seismology II - Course Syllabus

Course Number: ErSE 310

Course Title: Seismology II

Academic Semester:	Spring	**Academic Year:**	2015/ 2016
Semester Start Date:	Jan 24, 2016	**Semester End Date:**	May 19, 2016

Class Schedule: Mon/Thu 10:30 - 12:00

Classroom Number:

Instructor(s) Name(s): P. Martin Mai; D. Peter
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Office Location: Bdlg 3, 3114

COURSE DESCRIPTION FROM PROGRAM GUIDE

Part I: Whole Earth wave propagation (body waves, surface waves, normal modes); imaging Earth 3D structure with ray-based methods; introduction to methods beyond ray-theory; attenuation and scattering of seismic waves. Part II: Earthquake source mechanics; earthquake kinematics and scaling laws; earthquake dynamics, fracture modes and crack propagation; introduction to probabilistic seismic hazard assessment.

COMPREHENSIVE COURSE DESCRIPTION

The course provides an introduction to global seismology and earthquake physics, and consists of two parts.

Part I: Whole Earth wave propagation (body waves, surface waves, normal modes); imaging Earth 3D structure with ray-based methods; introduction to methods beyond ray-theory; attenuation and scattering of seismic waves.

Part II: Earthquake source mechanics; earthquake kinematics and scaling laws; earthquake dynamics, fracture modes and crack propagation; introduction to probabilistic seismic hazard assessment. Throughout the semester, students work in teams towards a term project, with intermediate discussion sessions and short reports leading up to a final project report and presentation.

WEEK 1. Intro & History + Representation & Betty Theorems

WEEK 2. Body Waves

WEEK 3. Surface Waves

WEEK 4. Normal Modes

WEEK 5. Ray Theory + Finite-Frequency

WEEK 6. Seismic Sources 1

WEEK 7. Seismic Sources 2

WEEK 8. Kinematics & Dynamics of Earthquakes

WEEK 9. Attenuation & Scattering

WEEK 10. Ambient Noise Seismology

WEEK 11. Seismic Hazard Assessment 1

WEEK 12. Seismic Hazard Assessment 2

WEEK 13. Numerical Methods in Seismology 1

WEEK 14. Numerical Methods in Seismology 2 (final exam (30min)?)

WEEK 15 Exams & Student Presentations

GOALS AND OBJECTIVES

After taking this course, students will have the background knowledge necessary to start an original research project in global theoretical seismology.

REQUIRED KNOWLEDGE

Basic knowledge of seismic wave propagation, partial differential equations and linear algebra.

REFERENCE TEXTS

Aki, K. and P. G. Richards, Quantitative Seismology, second edition, University Science Books, Sausalito, 2002.

Dahlen, F. A. and J. Tromp, Theoretical Global Seismology, Princeton University Press, Princeton, 1998.

Stein and Wysession, An Introduction to Seismology, Earthquakes, And Earth Structure - Blackwell - 2003

Shearer, P., Introduction to Seismology, Cambridge University Press, 1999.

METHOD OF EVALUATION

Percentages %	Graded content
15% **15%** **30%** **40%**	**weekly home works** **mid term exam** **final exam** **project & project presentation**

COURSE REQUIREMENTS

Assignments

(1) weekly home works to review the material and expand its understanding; these may require some programming and written assignment;
(2) student project, to be conducted in teams of 2 students working on a dedicated subject, and presenting the results as a report and a ~30 min presentation to the class

Course Policies

+ late home works only accepted with consent of instructor, with potential penalty due to late submission
+ absences should be indicated to the instructor at least two days prior to class; if this is not possible (due to illness), contact instructor as soon as possible after the missed class

Additional Information

n/a

NOTE
The instructor reserves the right to make changes to this syllabus as necessary.