جامعة الملك عبدالله
للعلوم والتقنية
King Abdullah University of
Science and Technology

Course Syllabus: Seismology II - ErSE 310

Division	Physical Science and Engineering Division
Course Number	ErSE 310
Course Title	Seismology II
Academic Semester	Spring
Academic Year	2018/2019
Semester Start Date	01/27/2019
Semester End Date	05/23/2019
Class Schedule (Days & Time)	10:30 AM - 12:00 PM | Mon Wed

Instructor(s)

Name	Email	Phone	Office Location	Office Hours
Paul Martin Mai	martin.mai@kaust.edu.sa	+966128080266	3114, 1, Al-Khawarizmi (bldg. 1)	office hours will be held based on student's needs and requests
Daniel Bernhard Peter	daniel.peter@kaust.edu.sa		0146, 1, Al-Khawarizmi (bldg. 1)	office hours based on student's needs & requests

Teaching Assistant(s)

Name	Email

Course Information

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.
Course Description from Program Guide	The course provides an introduction to global seismology and earthquake physics, and consists of two (2) 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.
Goals and Objectives	After taking this course, students will have the background knowledge necessary to start original research in global seismology and earthquake source studies.
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	**30.00**% - Written report **30.00**% - Oral presentation **20.00**% - Homework /Assignments **20.00**% - Course Project(s)
Nature of the assignments	(1) regular home works to review the material and expand its understanding; these may require some programming and written assignments; (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 submission of a homework result in a penalty due to late submission, and may be accepted only if prior notification is given to the instructor + 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

Tentative Course Schedule *(Time, topic/emphasis & resources)*		
Week	**Lectures**	**Topic**
1	Mon 01/28/2019	Introduction to and History of Global Seismology
1	Wed 01/30/2019	Betty's theorem and representation theorem
2	Mon 02/04/2019	Body waves, part 1
2	Wed 02/06/2019	Body waves, part 2
3	Mon 02/11/2019	Surface waves, part 1
3	Wed 02/13/2019	Surface waves, part 2
4	Mon 02/18/2019	Normal modes, part 1
4	Wed 02/20/2019	Normal modes, part 2
5	Mon 02/25/2019	Seismic ray theory
5	Wed 02/27/2019	Finite frequency seismology
6	Mon 03/04/2019	Earthquake source theory, part 1
6	Wed 03/06/2019	Earthquake source theory, part 2
7	Mon 03/11/2019	Earthquake source kinematics, part 1
7	Wed 03/13/2019	Earthquake source kinematics, part 2
8	Mon 03/18/2019	Earthquake source dynamics, part 1
8	Wed 03/20/2019	Earthquake source dynamics, part 2
9	Mon 03/25/2019	Spring Break
9	Wed 03/27/2019	Spring Break
10	Mon 04/01/2019	Near-source ground-motion prediction
10	Wed 04/03/2019	Near-source ground-motion simulation
11	Mon 04/08/2019	Seismic hazard assessment, part 1
11	Wed 04/10/2019	Seismic hazard assessment, part 2
12	Mon 04/15/2019	Attentuation of seismic waves in complex media
12	Wed 04/17/2019	Seismic scattering in complex media
13	Mon 04/22/2019	Diffuse seismic wavefields
13	Wed 04/24/2019	Ambient noise seismology, part 1
14	Mon 04/29/2019	Ambient noise seismology, part 2
14	Wed 05/01/2019	Ambient noise seismology, part 3
15	Mon 05/06/2019	Numerical methods in global seismology, part 1
15	Wed 05/08/2019	Numerical methods in global seismology, part 2
16	Mon 05/13/2019	Student project presentations
16	Wed 05/15/2019	Student project presentations
17	Mon 05/20/2019	Final Exam Week
17	Wed 05/22/2019	Final Exam Week

Note

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