

课程大纲 COURSE SYLLABUS

1.	课程代码/名称 Course Code/Title	地震面波和背景噪声成像/Earthquake surface wave and ambient noise tomography
2.	课程性质 Compulsory/Elective	专业选修课/Elective
3.	开课单位 Offering Dept.	地球与空间科学系/Department of Earth and Space Sciences
4.	课程学分/学时 Course Credit/Hours	3/48
5.	授课语言 Teaching Language	中文/Chinese
6.	授课教师 Instructor(s)	杨英杰/Yingjie Yang
7.	开课学期 Semester	2023 春季
8.	是否面向本科生开放 Open to undergraduates or not	否/No
9.	先修要求 Pre-requisites	(如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.) 无
10.	教学目标 Course Objectives	(如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.) 学生完成本课程后, 将会: (1) 掌握地震面波的成像方法; (2) 掌握地震背景噪声数据的处理方法; (3) 具备对选定研究区域进行结构成像的能力。 Upon completion of the course, students will: (1) master the methods of surface wave tomography (2) be able to process the ambient noise data; (3) be able to constrain velocity structure of a research area
11.	教学方法 Teaching Methods	(如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.) 本课程将以课堂讲授为主, 辅以学期论文项目和作业, 有期中和期末两次考试。 The course will compose lectures, homework, mid-term and final exams.
12.	教学内容 Course Contents	(如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.)

Section 1	Introduction to Seismology and earthquake surface waves (4 hrs) Introduction the background knowledge of seismology and surface waves.
Section 2	Review of Earthquake surface wave tomography (6 hrs) Review various methods of earthquake surface wave tomography. One-station method; two-station method, array-based method.
Section 3	Introduction to ambient noise tomography (ANT) and the underling physical (6 hrs) Introduce what is ANT, why and how it works.
Section 4	ANT data processing and dispersion measurements (5 hrs) Extract Cross-Correlation Functions (CCFs) from ambient noise and measure Rayleigh and Love wave dispersion.
Section 5	ANT and applications (5 hrs) Constrain lithospheric structures with ANT.
Section 6	H/V ratio and its application. (5 hrs) Introduce the processing of measuring H/V ratio of Rayleigh surface wave and its application of constraining shallow structure
Section 7	Stacking methods of ANT. (5 hrs) Review various methods of extracting CCFs from ambient noise data.
Section 8	Body waves from ambient noise. (5 hrs) Introduce methods and applications of extracting body wave signals from ambient noise data.
Section 9	Temporal variations based on ambient noise. (5 hrs) Measure the velocity change of medium with ambient noise data.
Section 10	Term project presentations. (2 hrs) Oral presentations for term projects
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13. 课程考核 Course Assessment	
	(① 考核形式 Form of examination; ②. 分数构成 grading policy; ③ 如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.) 出勤 5%+作业 20%+期中考试 25%+期末考试 25%+学期论文和报告 25% Attendance 5% + homework 20% + midterm exam 25% + final exam 25% + term paper and presentation 25%
14. 教材及其它参考资料 Textbook and Supplementary Readings	
	Nori Nakata, Lucia Gualtieri, Andreas Fichtner, Seismic ambient noise, Cambridge university press, 1st edition, 2019