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| **112(2)/2024 SPRING Semester TIGP-ESS課程資訊表**  **112(2)/2024 SPRING Semester TIGP-ESS course information form** | | | |
| 科目名稱(中文) | | 低頻地震學 | |
| Course Title (English) | | Low Frequency Seismology | |
| 授課時間  Time | | Monday, 2–5 PM, 2023 Spring semester | |
| 授課地點  Location | | 中央研究院 地球科學研究所 room 314 | |
| 學分數  Course Credits | | 3 | |
| 主要授課老師 Main Instructors | | 洪淑蕙老師(Shu-Huei Hung)、陳伯飛老師(Po-Fei Chen) | |
| 聯絡郵件  E-mail | | [shung@g.ntu.edu.tw](mailto:shung@g.ntu.edu.tw); [bob@ncu.edu.tw](mailto:bob@ncu.edu.tw) | |
| 辦公時間 Office Hours | | By appointment | |
| 課程目標 Course Objectives | | Seismology is crucial in probing the Earth's structures and understanding earthquake source properties. Low-frequency seismology encompasses surface waves and normal modes of the Earth, both of which are essential tools for studying earthquake sources and Earth's structures. This course introduces the theoretical background and synthetics of surface waves and normal modes of the Earth. | |
| 授課內容 Course Description | | Surface wave, Free oscillation, Propagator Matrix, Tomography, Synthetics | |
| 教科書/參考書 Textbooks/References | | Quantitative Seismology, 2nd edition (2002), Aki and Richards | |
| 自編教材比例  Self-compiled Textbook/References Proportion(if any) | | 20% | |
| 授課方式 Course Requirements | | ■講授(Lecture)；  □研討(Seminar)；  □實習/實驗(Internship/Experiment)；  □個別指導(Individual Discussion)；  □其他(Other) | |
| 評量配分比重 Course Grade | | Attendance : 50%  Homework : 50% | |
| 課程領域Areas | | □基礎學科(共同)(Basic subjects (common))  ■固態地球科學(Solid earth sciences)  □水圈科學(Aquatic sciences) [1]  □應用語言(Applied Languages)  □大氣科學(Atmospheric sciences) [2] | |
| 產業領域Areas | | □地探科技(Geological monitoring technology)  □氣象科技(meteorological science and technology)  □太空科技(Space Technology) [1]  □環保科技(environmental protection science and technology)  □資訊科技(Informational Technology) [2]  ■教學研究(Teaching & research)  □地質科技(Geosciences and technology) | |
| 課程進度與內容  Lecture outline and content | | | |
| 週次  week | 主題  Topic | | 授課教師/指定閱讀或作業  Instructor/Readings or assignments |
| **1** | Love Waves | | Po-Fei Chen |
| **2** | Rayleigh Waves | | Po-Fei Chen |
| **3** | Plane Waves in Homogeneous Media | | Po-Fei Chen |
| **4** | Methods of Displacement-Stress Vector | | Po-Fei Chen |
| **5** | Propagator Matrix Method | | Po-Fei Chen |
| **6** | Variational Principle for Love and Rayleigh Waves | | Po-Fei Chen |
| **7** | Surface Wave Tomography | | Po-Fei Chen |
| **8** | Earth Noise | | Po-Fei Chen |
| **9** | Midterm | | Po-Fei Chen |
| **10** | Free oscillation of a homogenous liquid sphere | | Shu-Huei Hung |
| **11** | Excitation of free oscillations by a point source | | Shu-Huei Hung |
| **12** | Surface waves on the spherical Earth | | Shu-Huei Hung |
| **13** | Mode-ray duality | | Shu-Huei Hung |
| **14** | Free oscillations of a self-gravitating earth | | Shu-Huei Hung |
| **15** | Mode attenuation, splitting and coupling | | Shu-Huei Hung |
| **16** | Normal mode synthetics | | Shu-Huei Hung |
| **17** | Full-waveform tomography | | Shu-Huei Hung |
| **18** | Final | | Shu-Huei Hung |
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| 課程所屬學制(Educational System): 博士班(Doctoral Program) | | | |
| 核心能力I: 請點選本課程培養學生具備核心能力之強度指數，並填寫對應之評量方式  Please select core abilities and its corresponding assessments of this course | | | |
| 請勾選學程所訂之核心能力(可複選)  ■獨立思考與研究能力Independent thinking and research capacity  ■進階數理及專業知識能力Advanced mathematical and professional knowledge and ability  □觀測模擬及分析推理能力Observation simulation and analysis of reasoning ability  ■電腦及程式語言運用能力Computer and programming language proficiency  ■國際視野與語文溝通能力International perspective and language communication skills  □專業倫理及服務學習能力Professional ethics and service-learning ability | | | |
| 核心能力II: 請點選本課程培養學生具備核心能力之強度指數，並填寫對應之評量方式  Please select the core abilities and its corresponding assessments of this course | | | |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 強度指數 Overall rating of Core Abilities | 1 非常低 Very Low | 2 低 Low | 3 普通 Medium | 4 高 High | 5 非常高 Very High | 評量方式 Corresponding Assessments | | 獨立思考與研究能力 Independent thinking and research capacity | □ | □ | □ | □ | ■ | □紙筆測驗/會考(Test/Exam)  ■作業練習(Assignments)  □口頭報告/口試(Presentation/Oral Exam)  □專題研究報告(書面)  (Research Report(printed on paper))  □實作/實驗(Practices/Experiments)  ■出席/課堂表現(Attendance/Performance)  □學習檔案評量(Portfolios Assessment)  □自我評量/同儕互評  (Self-Assessment/ Peer Assessment)  □作品/創作展演  (Products/Creative Performance)  □其他(Others) | | 進階數理及專業知識能力 Advanced mathematical and professional knowledge and ability | □ | □ | □ | □ | ■ | □紙筆測驗/會考(Test/Exam)  ■作業練習(Assignments)  □口頭報告/口試(Presentation/Oral Exam)  □專題研究報告(書面)  (Research Report(printed on paper))  □實作/實驗(Practices/Experiments)  ■出席/課堂表現(Attendance/Performance)  □學習檔案評量(Portfolios Assessment)  □自我評量/同儕互評  (Self-Assessment/ Peer Assessment)  □作品/創作展演(Products/Creative Performance)  □其他(Others) | | 觀測模擬及分析推理能力 Observation simulation and analysis of reasoning ability | □ | □ | ■ | □ | □ | □紙筆測驗/會考(Test/Exam)  ■作業練習(Assignments)  □口頭報告/口試(Presentation/Oral Exam)  □專題研究報告(書面)  (Research Report(printed on paper))  □實作/實驗(Practices/Experiments)  ■出席/課堂表現(Attendance/Performance)  □學習檔案評量(Portfolios Assessment)  □自我評量/同儕互評  (Self-Assessment/ Peer Assessment)  □作品/創作展演(Products/Creative Performance)  □其他(Others) | | 電腦及程式語言運用能力Computer and programming language proficiency | □ | □ | □ | ■ | □ | □紙筆測驗/會考(Test/Exam)  ■作業練習(Assignments)  □口頭報告/口試(Presentation/Oral Exam)  □專題研究報告(書面)  (Research Report(printed on paper))  □實作/實驗(Practices/Experiments)  ■出席/課堂表現(Attendance/Performance)  □學習檔案評量(Portfolios Assessment)  □自我評量/同儕互評  (Self-Assessment/ Peer Assessment)  □作品/創作展演(Products/Creative Performance)  □其他(Others) | | 國際視野與語文溝通能力 International perspective and language communication skills | □ | □ | □ | ■ | □ | □紙筆測驗/會考(Test/Exam)  ■作業練習(Assignments)  □口頭報告/口試(Presentation/Oral Exam)  □專題研究報告(書面)  (Research Report(printed on paper))  □實作/實驗(Practices/Experiments)  ■出席/課堂表現(Attendance/Performance)  □學習檔案評量(Portfolios Assessment)  □自我評量/同儕互評  (Self-Assessment/ Peer Assessment)  □作品/創作展演(Products/Creative Performance)  □其他(Others) | | 專業倫理及服務學習之能力 Professional ethics and service-learning ability | □ | ■ | □ | □ | □ | □紙筆測驗/會考(Test/Exam)  ■作業練習(Assignments)  □口頭報告/口試(Presentation/Oral Exam)  □專題研究報告(書面)  (Research Report(printed on paper))  □實作/實驗(Practices/Experiments)  ■出席/課堂表現(Attendance/Performance)  □學習檔案評量(Portfolios Assessment)  □自我評量/同儕互評  (Self-Assessment/ Peer Assessment)  □作品/創作展演(Products/Creative Performance)  □其他(Others) | | | | |