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| **114(1)/2025 Fall Semester TIGP-ESS課程資料表****114(1)/2025 Fall Semester TIGP-ESS course information form** |
| 科目名稱(中文) | 地震預報 |
| Course Title (English) | Earthquake Forecasting |
| 授課時間Time | Wednesday 15:00-17:00 |
| 授課地點Location | Room 414A, IES, Academia Sinica |
| 學分數Course Credits | 2 |
| 主要授課老師Main Instructors | 詹忠翰 Chung-Han Chan |
| 聯絡郵件E-mail | chchan@ncu.edu.tw |
| 辦公時間Office Hours | 8am-5pm Mon.-Fri. |
| 課程目標Course Objectives | - Obtain earthquake catalogue for earthquake in the globe and Taiwan- Understand approaches for earthquake statistics- Practice earthquake probability forecasting approach through statistical seismology |
| 授課內容Course Description | - Introduction, outline, and grouping - Earthquake and global plate tectonics- Data analyze- Approaches for earthquake statistics- Methods for earthquake probability assessment- Group presentations for earthquake statistics- Limitation of seismological approaches - Earthquake probability assessment considering active fault parameters- Earthquake catalogues in Taiwan- Approaches for earthquake statistics through Taiwan cases- Final exam- Review the exam results |
| 教科書/參考書Textbooks/References | Tsai, Y.B., 2019. The Next Big Ones: Forecasting the Probability of Large Earthquakes in the World. National Central University Press |
| 自編教材比例Self-compiled Textbook/References Proportion(if any) |  30 % |
| 授課方式Course Requirements | V講授(Lecture)；V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 | Homework: 40 %;Mid-term presentation: 30 %Final exam: 30 %. |
| 對應之永續發展目標(SDGs)(請選擇至多3項與教學內容相關的項目) Corresponding Sustainable Development Goals (SDGs) (Please choose up to 3 items related to the teaching content) | □SDG1消除貧窮No Poverty□SDG2消除飢餓Zero Hunger□SDG3健康與福祉Good Health and Well-beingVSDG4優質教育Quality Education□SDG5性別平等Gender Equality□SDG6潔淨飲水與衛生Clean Water and Sanitation□SDG7永續能源Affordable and Clean Energy□SDG8就業與經濟成長Decent Work and Economic Growth□ SDG9產業永續創新Industry, Innovation, and Infrastructure□SDG10減少不平等Reduced InequalityV SDG11永續城市與社區Sustainable Cities and Communities□SDG12永續消費及生產Responsible Consumption and Production□SDG13氣候行動Climate Action□SDG14水生生態Life Below Water□SDG15陸地生態Life on Land□SDG16和平與正義制度Peace, Justice, and Strong Institutions□SDG17全球夥伴Partnerships for the Goals |
| 課程類別Course Category | V STEAM□人文關懷Humanities and Social SciencesV跨域課程Interdisciplinary CoursesV問題導向Problem-Based LearningV總整課程Integrated Curriculum□媒體識讀Media Literacy□創新課程Innovative Curriculum□自主學習課程Self-Directed Learning□無None |
| 課程領域Areas | V基礎學科(共同)(Basic subjects (common)) V固態地球科學(Solid earth sciences) □水圈科學(Aquatic sciences) □應用語言(Applied Languages) □大氣科學(Atmospheric sciences) |
| 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) □環保科技(environmental protection science and technology) □資訊科技(Informational Technology) □教學研究(Teaching & research) □地質科技(Geosciences and technology) |

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| 課程進度與內容Lecture outline and content |
| 週次week | 日期Date | 主題Topic | 授課教師/指定閱讀或作業Instructor/Readings or assignments |
| **1** | Sep 3 | Introduction, outline, and grouping | Chung-Han Chan |
| **2** | Sep 10 | Earthquake and global plate tectonics | Chung-Han Chan |
| **3** | Sep 17 | Data used | Chung-Han Chan |
| **4** | Sep 24 | Methods for forecasting probabilities of large earthquakes | Chung-Han Chan |
| **5** | Oct 1 | Global earthquakes in different depth ranges | Chung-Han Chan |
| **6** | Oct 8 | Group presentations for earthquake forecasting | Chung-Han Chan |
| **7** | Oct 15 | Presentations and discussion | Chung-Han Chan/Presentations by students |
| **8** | Oct 22 | Presentations and discussion | Chung-Han Chan/Presentations by students |
| **9** | Oct 29 | Presentations and discussion | Chung-Han Chan/Presentations by students |
| **10** | Nov 5 | Limitation of these seismological approaches | Chung-Han Chan |
| **11** | Nov 12 | Active fault parameters | Chung-Han Chan |
| **12** | Nov 19 | Earthquakes forecasting considering active faults | Chung-Han Chan |
| **13** | Nov 26 | Earthquake forecasting for Taiwan | Chung-Han Chan |
| **14** | Dec 10  | Earthquake forecasting around the world | Chung-Han Chan |
| **15** | Dec 24 | Final exam | Chung-Han Chan |
| **16** | Dec 31 | Review the exam results | Chung-Han Chan |
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| 課程所屬學制(Educational System): 博士班(Doctoral Program) |

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| 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)V獨立思考與研究能力Independent thinking and research capacityV進階數理及專業知識能力Advanced mathematical and professional knowledge and abilityV觀測模擬及分析推理能力Observation simulation and analysis of reasoning abilityV電腦及程式語言運用能力Computer and programming language proficiencyV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 |
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| 強度指數Overall ratingof 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 | □ | □ | □ | □ | V | V紙筆測驗/會考(Test/Exam) V作業練習(Assignments) V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) V自我評量/同儕互評(Self-Assessment/ Peer Assessment) V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 | □ | □ | □ | □ | V | V紙筆測驗/會考(Test/Exam) V作業練習(Assignments) V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) V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 | □ | □ | □ | V | □ | V紙筆測驗/會考(Test/Exam) V作業練習(Assignments) V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) V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 | □ | □ | □ | V | □ | V紙筆測驗/會考(Test/Exam) V作業練習(Assignments) V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) V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 | □ | □ | V | □ | □ | □紙筆測驗/會考(Test/Exam) V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) V自我評量/同儕互評(Self-Assessment/ Peer Assessment) V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 | V | □ | □ | □ | □ | □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)  |

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