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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) | | 板塊構造地質學 | |
| Course Title (English) | | Geology and Tectonics | |
| 授課時間  Time | | Tuesday, 13:00 pm – 16:00 pm | |
| 授課地點  Location | | IES 414 | |
| 學分數  Course Credits | | 3 | |
| 主要授課老師 Main Instructors | | 李建成、波玫琳、陳致同、詹瑜璋 Jian-Cheng Lee, Maryline Le Beon, Chih-Tung Chen, Yu-Chang Chan | |
| 聯絡郵件  E-mail | | Jian-Cheng -Lee-jclee@earth.sinica.edu.tw Maryline Le Beon -mlebeon@gmail.com  Chih-Tung Chen -chihtung@ncu.edu.tw  Yu-Chang Chan -yuchang@earth.sinica.edu.tw | |
| 辦公時間 Office Hours | | By appointment | |
| 課程目標 Course Objectives | | The theory of plate tectonics coupled with knowledge in geology is successful to explain interrelationships among many observations and processes on Earth, such as mineral distributions, topography, mass extinctions, climate change, volcanoes, earthquakes and other natural hazards, and even the evolution of Earth’s life itself. In brief, it provides a single unifying theory of Earth’s dynamics. Essentially every geological process about our planet is related either directly or indirectly to plate tectonics. The objective of this course is to provide geoscientists from various fields with the basic concepts of plate tectonics, related geological processes and phenomena observable at modern and recent time. | |
| 授課內容 Course Description | | In this course we introduce how the theory of plate tectonics developed and discuss the evidence upon which it is based. We then illustrate how geoscientists adopted the theory to investigate the dynamics of the Earth searching for a variety of questions or problems, for example the nature of the lithospheric plates, what causes them to move, how we measure the rates and direction of plate motion, how mountain ranges form and so on. We also introduce interactions between the geosphere and the hydrosphere and atmosphere during the Quaternary, which led to the formation of present landscapes and sedimentary environments. Concepts and methods will be introduced. Then cases studies, including the Taiwan mountain belt, will be presented to illustrate the dynamics at plate boundaries, from long-term geological processes (1-10 Ma) to on-going active deformation and the earthquake cycle. | |
| 教科書/參考書 Textbooks/References | | 1. Kearey P. and Vine F. J., 1996. Global tectonics, Blackwell Science.  2. Tectonics of Sedimentary Basins, 1995. Blackwell Science, edited by Cathy J. Busby & Raymond V. Ingersoll  3. Skinner, B.J. and Porter, S.C., 2000. The dynamic earth: an introduction to physical geology. 4rd ed., New York, John Wiley & Sons, Inc.  4. Allen, P.A. and Allen, J.R., 2005. Basin analysis: principles & applications: Blackwell Science, Oxford, UK, 549 pp.  5. Burbank, D. W. and Anderson, R. S., 2011, Tectonic Geomorphology. John Wiley & Sons. | |
| 自編教材比例  Self-compiled Textbook/References Proportion(if any) | | 80% | |
| 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 | | 期中考 30%  期末考 40%  作業 30% | |
| 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** | Concepts of Plate Tectonics | | 詹瑜璋 |
| **2** | Rock-Forming Minerals | | 詹瑜璋 |
| **3** | Metamorphism and Evolving Continents | | 詹瑜璋 |
| **4** | Driving Mechanisms of Plate Tectonics | | 詹瑜璋 |
| **5** | Quaternary geology and geomorphology | | 波玫琳 |
| **6** | Tectonic geomorphology: faults | | 波玫琳 |
| **7** | Tectonic geomorphology: landscapes | | 波玫琳 |
| **8** | National Holiday (4/5) | |  |
| **9** | Active fault investigations | | 波玫琳 |
| **10** | Plate Boundary Observatory (US) - I | | 李建成 |
| **11** | Plate Boundary Observatory (Taiwan)– II | | 李建成 |
| **12** | Plate Boundary Observatory (US)– III | | 李建成 |
| **13** | Plate Boundary Observatory (Tw and world)- IV | | 李建成 |
| **14** | Mountain building processes (I methodology) | | 陳致同 |
| **15** | Mountain building (II concepts) | | 陳致同 |
| **16** | Mountain building processes (III Taiwan and other cases) | | 陳致同 |
| **17** | Mountain building processes (IV) | | 陳致同 |
| **18** | Final exam | |  |
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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) | | | | |