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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) | 應用地質統計學 |
| Course Title (English) | Applied Geostatistics |
| 授課時間  Time | Friday 9:00-12:00 am |
| 授課地點  Location | RCEC 4032 |
| 學分數  Course Credits | 3 |
| 主要授課老師 Main Instructors | Dr. Chuen-Fa Ni |
| 聯絡郵件  E-mail | nichuenfa@geo.ncu.edu.tw |
| 辦公時間 Office Hours | By appointment |
| 課程目標 Course Objectives | This course aims to provide fundamental knowledge of geostatistics for describing and evaluating different types of Earth environmental data. |
| 授課內容 Course Description | The topics will include:   1. Exploratory data analysis 2. Spatial data analysis and variogram fitting 3. Regressions and geostatistical interpolations 4. Geostatistical simulations for applications |
| 教科書/參考書 Textbooks/References | Isaaks Edward H. and R. Mohan Srivastava (1989), An Introduction to Applied Geostatistics, Oxford University Press, Inc.  Kitanidis P.K. (1997), Introduction to Geostatistics – Applications in Hydrogeology, Cambridge University Press, Inc.  Gelhar, Lynn W.(1993), Stochastic Subsurface Hydrology, Prentice-Hall, Inc.  Goovaerts, Pierre. (1997), Geostatistics for Natural Resources Evaluation, Oxford Academic. |
| 自編教材比例  Self-compiled Textbook/References Proportion(if any) |  |
| 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 | Homework/mini projects/presentations 60%, Midterm 20%, Final exam 20% |
| 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-being  ⯀SDG4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 Inequality  □ 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 | □ STEAM  □人文關懷Humanities and Social Sciences  ⯀跨域課程Interdisciplinary Courses  ⯀問題導向Problem-Based Learning  □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 | ⯀基礎學科(共同)(Basic subjects (common))  ⯀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. 04 | Introduction of the course |  |
| **2** | Sep. 11 | The data and data sets | HW 1 assigned |
| **3** | Sep. 18 | Data description | HW 1 due |
| **4** | Sep. 25 | Evaluations of spatial data |  |
| **5** | Oct. 02 | Missing data and data scarcity | HW 2 assigned |
| **6** | Oct. 09 | Concept of regressions and interpolations | HW 2 due |
| **7** | Oct. 16 | Regression and interpolation algorithms |  |
| **8** | Oct. 23 | Interpolation - case study | HW 3 assigned |
| **9** | Oct. 30 | Midterm | HW 3 due |
| **10** | Nov. 06 | Concept of geostatistical interpolation |  |
| **11** | Nov. 13 | Kriging | HW 4 assigned |
| **12** | Nov. 20 | Co-kriging | HW 4 due |
| **13** | Nov. 27 | Case study |  |
| **14** | Dec. 04 | Concept of geostatistical simulations | HW 5 |
| **15** | Dec. 11 | Uncertainty- case study | HW 5 due |
| **16** | Dec. 18 | Final exam |  |
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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)  ⯀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) | |