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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
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| 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 |
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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 | □ | □ | □ | □ | ⯀ | ⯀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)  |

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