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| **112(1)/2023 Fall Semester TIGP-ESS課程資訊表****112(1)/2023 Fall Semester TIGP-ESS course information form** |
| 科目名稱(中文) | 人類活動與地表變遷 |
| Course Title (English) | Human Activities and Land Use/Land Cover Changes |
| 授課時間Time |  Tue 09.00 am -13.00 am (2 hours lecture + 2 hours exercise) |
| 授課地點Location | RCEC 2034 |
| 學分數Course Credits | 3 |
| 主要授課老師Main Instructors | 陳奕穎 Yi-Ying Chen  |
| 聯絡郵件E-mail | yiyingchen@gate.sinica.edu.tw |
| 辦公時間Office Hours |  e.g. Thru 3-5p.m. in IES R323 or by appointment |
| 課程目標Course Objectives | The course was designed for students interested in understanding the relationship between human history and environmental changes (e.g., land-use and land-cover changes). Two distinctive time scales, millennia and the latest 300-years, were selected to have a different look at the impact of land-use and land-cover changes on human life. The following topics: human history and scales, vegetation growth and climate, and reconstruction of historical land-cover/land-use and geological dating, and impact of land-use and land-cover changes on the global environment, were included in this lecture. I will discuss ideas and findings from selected journal papers, textbooks: “Land-Use and Land-Cover Change: Local Processes and Global Impacts” by Lambin, E.F. 2004 and “ Understanding Human History” by Hart, M. H. 2007 with students in this lecture. In addition, methods and coding skills for building a toy model to reconstruct/project LULCC will also introduce.期望以人類文明發展的角度觀察人類活動對於地球環境所產生的影響，其中包含: 人類文明與不同時、空尺度的介紹、植被與氣候之關聯、地質年代與地表覆蓋之重建、局地土地利用改變對全球環境之衝擊以及科學進展對於重建歷史地表覆蓋的貢獻。課程規劃期中考之前探討萬年以前的時間尺度、期中考以後探討近代約300年的時間尺度。最終將引導學生了解如何建構一個試驗性的土地覆蓋變化模式。 |
| 授課內容Course Description | An overall picture of human history on exploring the land of EarthThe impact of local land-use change on the global environmentAdvance in science development for reconstructing the past land-use and land-coverUnderstanding how to build a toy model to reconstruct the historical land-use and land-cover map and to project future land-use/land-cover map概括性的了解人類歷史與探索地球的歷程局地土地利用對全球環境改變的衝擊科學進展對於重建歷史地表覆蓋的與土地使用的貢獻建構一個試驗性的土地覆蓋變化模式 |
| 教科書/參考書Textbooks/References | 1. Lambin, E. F. and Geist, H. 2004. Land-Use and Land-Cover Change: Local Processes and Global Impacts. Springer2. Hart, M. H. 2007. Understanding Human History. Washington Summit Publisher |
| 自編教材比例Self-compiled Textbook/References Proportion(if any) | 80% Self-compiled Slides / 15% Reference papers/ 5% Open online resource**Reference:** 1. Allen, T. F. H., &Hoekstra, T. W.,1992. *Toward a Unified Ecology*.<https://doi.org/10.2307/4002476>
2. Canadell, J., Jackson, R., Ehleringer, J., Mooney, H. A., Sala, O. E.,andSchulze, E.-D. 1996. Maximum rooting depth of vegetation types at the global scale. *Oecologia* 108 583–595. <https://doi.org/10.1007/BF00329030>
3. Chang-Martínez, L. A., Mas, J. F., Valle, N. T., Torres, P. S. U.,andFolan, W. J. 2015. Modeling historical land cover and land use: A review from contemporary modeling. *ISPRS International Journal of Geo-Information* 4(4): 1791–1812. <https://doi.org/10.3390/ijgi4041791>
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8. Ellis, E. C. 2021. Land Use and Ecological Change: A 12,000-Year History. *Annual Review of Environment and Resources* 46 1–33. <https://doi.org/10.1146/annurev-environ-012220-010822>
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| 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 | Course participation: 30%Assignments: 20%Mid-term + Final: 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) ▓應用語言(Applied Languages) □大氣科學(Atmospheric sciences)▓人類圈與永續科學(Anthro & Sustain 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) |
| 課程進度與內容Lecture outline and content |
| 週次week | 周次/ 學習主題/學習時數(課前+課程+課後)小時/參考書(Textbook[T])與閱讀文章(Reference[R]) |
| **1** | Introduction of Scale and Human History (I)/4(0+2+2)/T[2], R[1][7][32][46] |
| **2** | Introduction of Scale and Human History (II)/ 4(1+2+1)/T[2], R[1][7][32][46] |
| **3** | Vegetation growth and Climate, and Chronology/5(2+2+1)/T[1,CH2][2], R[4][19][21][31][34][35] |
| **4** | Civilization and land-use/land-cover change (LULCC) over the Past 12,000 years (Indo-Europe)/4(1+2+1)/T[1,CH2][2], R[8][9][26] |
| **5** | Civilization and LULCC over the Past 12,000 years (Pan-Asia)/6(1+2+2)/T[1,CH2][2], R[8][9][26] |
| **6** | Global LULCC Reconstruction Projects/6(3+2+1)/T[1,CH1][2], R[3][12][13][19][26][33][47] |
| **7** | Modeling local LULCC: Build up a Toy Model (Formulation)/4(1+2+1)/T[1,CH5], R[38][39][40] |
| **8** | Modeling local LULCC: Build up a Toy Model (using R/GIS)/6(2+2+2)/T[1,CH5], R[27] |
| **9** | **Mid-term/5(3+1+1)** |
| **10** | Impact of LULCC on Climate Change/4(1+2+1)/T[1,CH4][2], R[14][15][44] |
| **11** | IPCC Special report on Climate Change and Land/4(1+2+1)/R[43] |
| **12** | Global LULCC over the past 300 years (Asia/China) /6(3+2+1)/T[1,CH2][2], R[6][18][20][22][23][24][25][45] |
| **13** | Global LULCC over the past 300 years (Europe) /6(3+2+1)/T[1,CH2][2], R[10][11][20][28][29][30] |
| **14** | Global LULCC Harmonization/6(3+2+1)/T[1,CH1][2], R[1][12][13][17][33][42][47] |
| **15** | Taiwan LULCC Reconstruction (II: 2020 to 1900)/4(1+2+1)/R[5][37] |
| **16** | Taiwan LULCC Reconstruction (I: 1900 to 1650)/4(1+2+1)/R[36][37] |
| **17** | Sustainable Land Management and Climate Objectivity/4(1+2+1)/T[1,CH6], R[41] |
| **18** | **Final exam/5(3+1+1)** |
| 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 |
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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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