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| **113(1)/2024 Fall Semester TIGP-ESS課程資料表****113(1)/2024 Fall Semester TIGP-ESS course information form** |
| 科目名稱(中文) | 海洋生物地球化學 |
| Course Title (English) | Marine Biogeochemistry |
| 授課時間Time |  Thu 9 a.m. - 12 p.m. |
| 授課地點Location | 中央研究院環境變遷研究中心RCEC Room 6040 |
| 學分數Course Credits | 3 |
| 主要授課老師Main Instructors | Tung-Yuan Ho (何東垣) |
| 聯絡郵件E-mail | tyho@gate.sinica.edu.tw |
| 辦公時間Office Hours | Mon 3-5 p.m. at RCEC 6032 by appointment |
| 課程目標Course Objectives | Understand the fundamental concepts and regulating mechanisms for how bioactive material (e.g., carbon) is cycled in the ocean |
| 授課內容Course Description | Material cycling biogeochemically in the ocean |
| 教科書/參考書Textbooks/References | “Ocean Biogeochemical Dynamics” by Sarmiento and Gruber (2006) |
| 自編教材比例Self-compiled Textbook/References Proportion(if any) | 20% from other reading materials, mainly from recent published papers |
| 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 | 30% for homework & quiz, 30% for mid-term, 40% for final exam |
| 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) 翻譯成英文的話就是：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) |
| 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** | **9/5** | Overview & Introduction | Tung-Yuan Ho |
| **2** | **9/12** | Chemical Composition 2-1 | Tung-Yuan Ho |
| **3** | **9/19** | Chemical Composition 2-2 | Tung-Yuan Ho |
| **4** | **9/26** | Physical Processes | Tung-Yuan Ho |
| **5** | **10/3** | Primary Production | Tung-Yuan Ho/Quiz |
| **6** | **10/10** | No class | Tung-Yuan Ho |
| **7** | **10/17** | Dissolved Inorganic Carbon | Tung-Yuan Ho |
| **8** | **10/24** | Chemical Speciation | Tung-Yuan Ho |
| **9** | **10/31** | Midterm | Tung-Yuan Ho |
| **10** | **11/7** | Major Nutrient 2-1 | Tung-Yuan Ho |
| **11** | **11/14** | Major Nutrient 2-2 | Tung-Yuan Ho |
| **12** | **11/21** | Minor Nutrient 2-1 | Tung-Yuan Ho |
| **13** | **11/28** | Minor Nutrient 2-2 | Tung-Yuan Ho |
| **14** | **12/5** | Organic Biogeochemistry | Tung-Yuan Ho/Quiz |
| **15** | **12/12** | Suspended and Sinking Particles | Tung-Yuan Ho |
| **16** | **12/19** | Final Exam | Tung-Yuan Ho |
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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 |
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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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