②国o支束華大學 教學計劃表 Syllabus

Cour	課程名稱(中文) se Name in Chinese	無機化學特論(三)學年/學期 Academic Year/Semestr						113/1		
Cour	課程名稱(英文) se Name in English	Special Topics in Inorganic Chemistry(III)								
	科目代碼 Course Code	CHEM72100	系級 172100 条級 Department & Year		F	開課單位 Course-Offering Department		化學系		
	修別 Type	選修 Elective								
	授課教師 Instructor	/劉鎮維								
	先修課程 Prerequisite									
課程描述 Course Description										
detailed 3D structure in atomic resolution for any new crystalline material. Due to the lack of X-ray diffractometer in NDHU, which was unfortunately malfunctioned after the big earthquake on April 3, 2024, I intend to focus on the techniques of solving the structures. The lectures will start at the general introduction of point group symmetry followed by the crystallographic symmetry, which will constitute the lecture materials of the first three weeks. A total of twelve weeks followed are needed to familiarize the SHELXL software in order to solve new structures. This part will be taught by Vincent Liao, a staff crystallographer in the Institute of Chemistry, Academia Sinica. He is willing to share his knowledge and experiences to the Ph. D. students, who are interested in the chemical synthesis. The students who attend the class must prepare at least one single crystal, which structure has never been deposited in the CSDB routinely. In addition, the students need to demonstrate in the final examination that they are capable of solving the structure by using the raw data provided by Dr. Vincent Liao. An accompanied Checkcif report without level-A alerts is required to pass the class. After the training, the students will become an expert in evaluating the structure accuracy. Thus if you are not doing the chemical synthesis and will never grow single crystals in your daily bench										
課程目標 Course Objectives										
依照督 討。	宮今無機化學領域之重要	發展與本所教師.	之專長,選擇無	展機化學	學領域	或之中重要主題,進	行深入淺	出的介紹與研		
条專業能力 課程目標與系專業 力相關性 Correlation between Course Objective Course Objective and Dept.'s Basic Learning Outcomes Education Objectives						程目標與系專業能 力相關性 relation between urse Objectives and Dept.'s Education Objectives				
A 具備化學專業知識							•			
В	具備設計與執行化學實驗之能力							0		
С	2 具備獨立研究之能						0			
D	D 具備國際競爭力									
圖示說明Illustration :● 高度相關 Highly correlated ○中度相關 Moderately correlated										

授課進度表 Teaching Schedule & Content							
週次Week	內容 Subject/Topics	備註Remarks					
1	The importance of X-ray crystallography in 3D structure determination: case studies						
2	Point group symmetry (Ch. 3) (Cotton's book)						
3	Crystallographic symmetry: 11.1 ~ 11.3 (Cotton's book)						
4	Conquest software Utilizing Conquest software for literature searches within the Cambridge Structural Database (CSD).						
5	Diffraction and crystal structure Introduction to diffraction theory and its application in determining crystal structures.						
6	Crystal system, Bravais lattice, and space groups Exploration of the 7 crystal systems, 14 Bravais lattices and 230 space groups, including their properties and significance.						
7	Miller indices and zone axis symbols Detailed discussion on Miller indices and zone axis symbols, essential for understanding crystal orientation and symmetry.						
8	Crystal growing and screening Techniques for growing and screening crystals suitable for X-ray diffraction analysis.						
9	期中考試週 Midterm Exam						
10	APEX software Hands-on training with APEX software, covering the determination of unit cells, phase-indexing, data collection, absorption correction, and structure solving.						
11	ShelXle software In-depth look at ShelXle software, including its operating principles and key commands for refining crystal structures.						
12	Practical exercises for solving crystal structure Practical sessions focused on solving crystal structures using the skills and software introduced in previous weeks.						
13	Checkcif report, common problems and solution Guidance on generating and interpreting Checkcif reports, with a focus on troubleshooting common issues.						
14	Plotting: Mercury and Diamond Techniques for visualizing and plotting crystal structures using Mercury and Diamond software.						
15	Plotting: Mercury and Diamond Techniques for visualizing and plotting crystal structures using Mercury and Diamond software.						
16	Neutron crystallography Introduction to neutron crystallography, its principles, and applications in determining crystal structures.						
17	The final exam will test students' ability to solve one crystal structure from raw data followed by generating a Checkcif report.						
18	期末考試週 Final Exam						

教 學 策 略 Teaching Strategies							
✓ 課堂講授 Lecture 分組討論Group Discussion 參觀實習 Field Trip							
✓ 其他Miscellaneous:							
教學創新自評 Teaching Self-Evaluation							
創新教學(Innovative Teaching)							
□ 問題導向學習(PBL)							
── 翻轉教室 Flipped Classroom ── 磨課師 Moocs							
社會責任(Social Responsibility)							
□ 在地實踐Community Practice □ 產學合作 Industy-Academia Cooperation							
跨域合作(Transdisciplinary Projects)							
□跨界教學Transdisciplinary Teaching □跨院系教學Inter-collegiate Teaching							
業師合授 Courses Co-taught with Industry Practitioners							
其它 other:							

學期成績計算及多元評量方式 Grading & Assessments									
配分項目	配分比例	多元評量方式 Assessments							
Items	Percentage	測驗 會考	實作 觀察	口頭 發表	專題 研究	創作 展演	卷宗 評量	證照 檢定	其他
平時成績 General Performance	50%								
期中考成績 Midterm Exam	10%								
期末考成績 Final Exam	40%								
作業成績 Homework and/or Assignments									
其他 Miscellaneous ()									
評量方式補充說明 Grading & Assessments Supplemental instructions									
The first three lectures (9:10 ~ 12 am) will take place at room D108 (人社學院) and the rest of classes (Tuesday evening, 6 ~ 9 pm) will be taught on line. Both mid-term and final examination will be held in room D108.									
教科書與參考書目(書名、作者、書局、代理商、說明) Textbook & Other References(Title, Author, Publisher, Agents, Remarks, etc.)									
Chemical Applications of Group Theory (3rd edition) by F. A. Cotton. (Chapters 3 & 11)									
課程教材網址(含線上教學資訊,教師個人網址請列位於本校內之網址) Teaching Aids & Teacher's Website(Including online teaching information. Personal website can be listed here.)									
其他補充說明(Supplemental instructions)									