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國立高雄科技大學
NATIONAL KAOHSIUNG UNIVERSITY OF SCIENCE AND TECHNOLOGY
授課大綱 Syllabus

部別 ： 日間部博士　　112學年度第2學期　　列印日期 ： 2024/03/01

中文課程名稱 ： 環境水化學	英文課程名稱 ： Environmental Water Chemistry	授課教師 ： 阮青平
開 課 班 級 ： 水產科技博班二甲	學　分 ： 3.0	授課時數 ： 3.0
合 班 班 級 ：		實習時數 ： 0.0

1.中文教學目標(Chinese Teaching objectives)

1. 建立水化學原理與應用之基本概念、培養正確的科學學習態度。 2. 建立修習水化學原理與應用等相關領域課程之基礎。 3. 建立解讀一般相關工程科學資訊的能力。

2.英文教學目標(English Teaching objectives)

1. Establish the basic concepts of Principles and applications of aqueous chemistry and develop an appropriate attitude towards scientific learning. 2. Establish the basis for studying courses in Principles and applications of aqueous chemistry and related fields. 3. Establish the ability to interpret general relevant engineering scientific information.

3.中文教學綱要(Chinese CourseDescription)

本課程涉及與自然和建築水環境系統相關的基本化學原理。該課程包括兩個主要類別；第一類將回顧一般化學，化學熱力學和化學動力學。第二類將探索水溶液中發生的主要化學反應。 第一類：(1)一般化學的快速概述開始，著重介紹常見的化學原理，例如化學計量，原子和分子結構，化學鍵和水結構。(2)了解水環境中相變和平衡的重要性外，還應發現化學熱力學，為平衡化學奠定基礎。(3)探討化學反應動力學的原理和應用。主要主題是速率理論，速率定律，催化，反應機理，溶液中的反應和界面反應。 第二類：(1)探討天然水中常見的幾種化學反應以及水的修復應用。主要主題包括封閉和開放系統中的酸鹼平衡，金屬離子化學，空氣-水界面處的傳質，電子轉化過程，礦物溶解和沉澱，最後是固液界面處的化學過程。(2)全面了解水生化學的三個主要變量，即pH (-log {H+}) ，pM (-log {Mn+}) 和pe (-log {e-}) 及其在建築和天然水環境中廣泛的化學反應方面的應用。(3)這些主要變量在描述天然水系統的化學組成以及水和廢水處理工藝設計中的應用。

4.英文教學綱要(English CourseDescription)

This course deals with the basic chemical principles of relevance to both natural and built water environmental systems. The course consists of two main clusters; cluster I will review general chemistry, chemical thermodynamics, and chemical kinetics. Cluster II will explore major chemical reactions occurring in aqueous solutions. Cluster I: The course will begin with a quick overview of general chemistry, emphasizing on common chemical principles such as stoichiometry, atomic and molecular structure, chemical bonding, and water structure. It is then to discover chemical thermodynamics as to establish the foundation of equilibrium chemistry in addition to understanding the importance of phase transition and equilibrium in water environment. We will then explore the principles and applications of chemical reaction kinetics. Major topics are rate theory, rate law, catalysis, reaction mechanisms, reaction in solution and reaction at interfaces. Cluster II: In this cluster, we will explore several chemical reactions commonly occurring in natural water as well as water renovation applications. The major subjects include acid-base equilibrium in closed and open systems, chemistry of metal ions, mass transfer at the air-water interface, electron transformation processes, mineral dissolution and precipitation, and finally the chemical processes at solid-liquid interfaces. Overall, the main goal of Cluster II is to gain comprehensive understanding of the three master variables of aquatic chemistry, namely, pH (-log{H+}), pM (-log{Mn+}) and pe (-log{e-}), and their applications with respect to a wide spectrum of chemical reactions in built and natural water environment. Our emphasis is on the applications of these master variables in describing the chemical composition of natural water systems and the design of water and wastewater treatment processes.

5.中文核心能力

	核心能力名稱	核心能力百分比
1	生物資源永續	10%

2	產銷管理能力	10%
3	整合與研究能力	40%
4	創新溝通能力	40%

6.英文核心能力

	核心能力名稱	核心能力百分比
1	Biological resource sustainability	10%
2	Production and sales management capabilities	10%
3	Integration and research skills	40%
4	Innovative communication skills	40%

7.教科書

中文書名 : 自編講義　英文書名：Self-product handouts
中文作者 :　英文作者：
1　中文出版社 :　英文出版社：
出版日期 : 年 月　備註：

8.參考書

中文書名 : 自編講義　英文書名：Self-product handouts
中文作者 :　英文作者：
1　中文出版社 :　英文出版社：
出版日期 : 年 月　備註：

9.教學進度表

週次或項目 Week or Items	中文授課內容 Chinese Course Content	英文授課內容 English Course Content	分配節次 Assigned Classes	備註 Note
	General chemical principles	General chemical principles	3	
	Chemical thermodynamics	Chemical thermodynamics	4	
	Chemical kinetics	Chemical kinetics	5	
	BrÖnsted acids and bases	BrÖnsted acids and bases	7	
	Exchange processes at the air-water interface	Exchange processes at the air-water interface	3	

Lewis acids and bases	Lewis acids and bases	5
Chemical precipitation and dissolution processes	Chemical precipitation and dissolution processes	4
Redox reactions	Redox reactions	7
Solid-Liquid Interfaces	Solid-Liquid Interfaces	4

10.中文成績評定(Chinese Evaluation method)

出席率、隨堂考試、作業、期中/期末考試

11.英文成績評定(English Evaluation method)

Attendance, quiz, homework, and the mid-/final- exams

12.中文課堂要求(Chinese Classroom requirements)

單槍

13.英文課堂要求(English Classroom requirements)

Projector

14.本課程與SDGs相關項目(This course is relevant to these of SDGs as following)

6.潔淨水與衛生(Clean Water and Sanitation);14.水下生命(Life Below Water);