Enquiry for Course Details

CHEM4148 Frontiers in Modern Chemical Science (6 credits)		Academic Year	2023
Offering Department	Chemistry	Quota	60
Course Co-ordinator	Prof X D Li, Chemistry < xiangli@hku.hk >		
Teachers Involved	((Visiting Professor) Dr X H Yan,Chemistry) (Prof X D Li,Chemistry)		
Course Objectives	Modern chemistry is thought to be the "central science" as it plays a critical role in related biological, physical, medical, and engineering disciplines. This course aims to introduce students to the newest concepts and technological breakthroughs in chemical sciences. Throughout the course, students will be introduced to how the interplay among molecules, materials, and interfaces leads to unprecedented functionalities that contribute to innovations in biology and medicine, smart materials, and sustainable energy schemes.		
Course Contents & Topics	Current topics focus on the interdisciplinary area of chemistry with biology, and material sciences. Covered topics include chemical genetics, epigenetics and proteomics; chemical biology for drug discovery and development; stimuli-responsive nanomaterials; autonomous macromolecular motion; future power landscape; renewable energy conversion and utilization. Examples in protein posttranslational modifications, active colloidal, thermoelectric materials, molecular machines, advanced rechargeable batteries, and next-generation fuel cells and electrolysers will be discussed.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: understand important principles and topical trends in chemical sciences CLO 2: demonstrate understanding of future directions in biomedical chemistry, nanomatertials, and energy sciences and applying this knowledge in comparing and contrasting various emergent technologies CLO 3: interpret and analyse recent published research data in the field of chemistry and extract relevant chemical information to explain the observed properties and phenomena associated to the chemical systems		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM3341 and CHEM3441.		
Course Status with Related Major/Minor /Professional Core	2023 Major in Chemistry (Disciplinary Elective) 2023 Major in Chemistry (Intensive) (Disciplinary Elective) 2023 Minor in Chemistry (Disciplinary Elective) 2022 Major in Chemistry (Disciplinary Elective) 2022 Major in Chemistry (Intensive) (Disciplinary Elective) 2022 Minor in Chemistry (Disciplinary Elective) 2021 Major in Chemistry (Disciplinary Elective) 2021 Major in Chemistry (Intensive) (Disciplinary Elective) 2021 Minor in Chemistry (Disciplinary Elective) 2020 Major in Chemistry (Disciplinary Elective) 2020 Major in Chemistry (Intensive) (Disciplinary Elective) 2020 Minor in Chemistry (Disciplinary Elective) 2019 Major in Chemistry (Disciplinary Elective) 2019 Major in Chemistry (Intensive) (Disciplinary Elective) 2019 Minor in Chemistry (Disciplinary Elective)		
Course to PLO Mapping	2023 Major in Chemistry < PLO 1,2,3,5 > 2023 Major in Chemistry (Intensive) < PLO 1,2,3,5 > 2022 Major in Chemistry < PLO 1,2,3,5 > 2022 Major in Chemistry (Intensive) < PLO 1,2,3,5 > 2021 Major in Chemistry < PLO 1,2,3,5 > 2021 Major in Chemistry (Intensive) < PLO 1,2,3,5 > 2020 Major in Chemistry < PLO 1,2,3,5 > 2020 Major in Chemistry (Intensive) < PLO 1,2,3,5 > 2019 Major in Chemistry < PLO 1,2,3,5 > 2019 Major in Chemistry (Intensive) < PLO 1,2,3,5 >		
Offer in 2023 - 2024	Y 2nd sem	Examination	May
Offer in 2024 - 2025	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough knowledge and understanding of essential facts, concepts and principles in chemical sciences, especially those relating to biomedical chemistry, nanomaterials, and energy sciences. Show strong ability to apply and integrate knowledge in chemical sciences in explaining the formation and properties of chemical species and in designing different chemical systems. Show strong ability to analyse and interpret experimental data to draw appropriate conclusions relating to the advanced principles and properties of chemical systems.
B	Demonstrate substantial knowledge and understanding of essential facts, concepts and principles in chemical sciences, especially those relating to biomedical chemistry, nanomaterials, and energy sciences. Show evidence to apply and integrate knowledge in chemical sciences in explaining the formation and properties of chemical species and in designing different chemical systems. Show evidence to analyse and interpret experimental data to draw appropriate conclusions relating to the advanced principles and properties of chemical systems.
C	Demonstrate general but incomplete amount of knowledge and understanding of essential facts, concepts and principles in chemical sciences, especially those relating to biomedical chemistry, nanomaterials, and energy sciences. Show some ability to apply and integrate knowledge in chemical sciences in explaining the formation and properties of chemical species and in designing different chemical systems. Show some ability to analyse and interpret experimental data to draw appropriate conclusions relating to the advanced principles and properties of chemical systems.
D	Demonstrate partial but incomplete command of knowledge and understanding of essential facts, concepts and principles in chemical sciences, especially those relating to biomedical chemistry, nanomaterials, and energy sciences. Show evidence of limited ability to apply and integrate knowledge in chemical sciences in explaining the formation and properties of chemical species and in designing different chemical systems. Show evidence of limited ability to analyse and interpret experimental data to draw appropriate conclusions relating to the advanced principles and properties of chemical systems.
Fail	Demonstrate little or no evidence of command of knowledge and understanding of essential facts, concepts and principles in chemical sciences, especially those relating to biomedical chemistry, nanomaterials, and energy sciences. Show little or no ability to apply and integrate knowledge in chemical sciences in explaining the formation and properties of chemical species and in designing different chemical systems. Show little or no ability to analyse and interpret experimental data to draw appropriate conclusions relating to the advanced principles and properties of chemical systems.

Course Type

Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	(20% Tests/Assignments; 5% participation)	25	CLO 1,2,3
Examination		40	CLO 1,2,3
Presentation		35	CLO 1,2,3

Required/recommended reading and online materials

References to specialized texts and other published materials will be made throughout the course.

Course Website

Additional Course Information

This course is also offered to RPg students, and the course code for RPg students is CHEM6118.