

Enquiry for Course Details

CHEM4544 Electrochemical science and technology (6 credits)		Academic Year	2021
Offering Department	Chemistry	Quota	36
Course Co-ordinator	Prof G K Y Chan, Chemistry < hrcscky@hku.hk >		
Teachers Involved	(Prof G K Y Chan, Chemistry) (Visiting Professor, Chemistry)		
Course Objectives	To understand the science of electrochemistry, methods to characterise electrochemical cells, and factors affecting electrochemical applications and technologies.		
Course Contents & Topics	Thermodynamics, kinetics, and transport of electrochemical processes. Electrochemical characterization by controlled potential, current, and hydrodynamics. Voltammetry for analytical chemistry. Electrochemical power sources, sensors, synthesis and separation processes. Electrolytes, separators, and electrode materials. Models of electrochemical processes.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
	CLO 1	Understand the thermodynamic and kinetics of a charge transfer process at the electrode-electrolyte interface and transport of relevant species in molecular and macroscopic scales.	
	CLO 2	Apply voltammetry methods to characterize an electrochemical process.	
	CLO 3	Correlate performance of electrochemical cells to materials, design, and operation parameters.	
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM3241 or CHEM3541 or CHEM3542		
Course Status with Related Major/Minor /Professional Core	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) 2018 Major in Chemistry (Disciplinary Elective) 2018 Major in Chemistry (Intensive) (Disciplinary Elective) 2018 Minor in Chemistry (Disciplinary Elective) 2017 Major in Chemistry (Disciplinary Elective) 2017 Major in Chemistry (Intensive) (Disciplinary Elective) 2017 Minor in Chemistry (Disciplinary Elective)		
Course to PLO Mapping	2021 Major in Chemistry < PLO 2 > 2021 Major in Chemistry (Intensive) < PLO 2 > 2020 Major in Chemistry < PLO 2 > 2020 Major in Chemistry (Intensive) < PLO 2 > 2019 Major in Chemistry < PLO 2 > 2019 Major in Chemistry (Intensive) < PLO 2 > 2018 Major in Chemistry < PLO 2 > 2018 Major in Chemistry (Intensive) < PLO 2 > 2017 Major in Chemistry < PLO 2 > 2017 Major in Chemistry (Intensive) < PLO 2 >		
Offer in 2021 - 2022	Y	2nd sem	Examination May
Offer in 2022 - 2023	N		
Course Grade	A+ to F		
Grade Descriptors	A	Demonstrate thorough knowledge of electrochemical science and technology, and mastery of skills required for attaining all of the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to solve problems in a wide range of complex, familiar and unfamiliar situations. Critical use of data and sourcing of references. Apply highly effective organizational and presentational skills.	
	B	Demonstrate substantial knowledge of electrochemical science and technology and command of skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to solve problems in familiar and some unfamiliar situations. Correct use of data and sourcing of references. Apply effective organizational and presentational skills.	
	C	Demonstrate general but incomplete knowledge of electrochemical science and technology and command of skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge solve problems to most familiar situations. Mostly correct but some erroneous use of data and references. Apply moderately effective organizational and presentational skills.	
	D	Demonstrate partial but limited knowledge of electrochemical science and technology and command of skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Limited ability to use data and source references. Apply limited or barely effective organizational and presentational skills.	
	Fail	Demonstrate little or no evidence of knowledge of electrochemical science and technology, and command of skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Misuse of data and references. Organization and presentational skills are minimally effective or ineffective.	
Course Type	Lecture with laboratory component course		

Course Teaching & Learning Activities	Activities		Details	No. of Hours
	Laboratory		Laboratory/Project	24
	Lectures			24
	Tutorials			6
	Reading / Self study			100
Assessment Methods and Weighting	Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
	Assignments		10	CLO 1,2,3
	Examination		50	CLO 1,2,3
	Laboratory reports	(Laboratory or Project Report/Term Paper)	10	CLO 1,2,3
	Test	(Test/ Quiz)	30	CLO 1,2,3
Required/recommended reading and online materials	K. B. Oldham, J. C. Myland, and A. B. Bond, Electrochemical Science and Technology, John Wiley & Sons, 2012, ISBN 978047071045. Bard, Allen J., Larry R. Faulkner. Electrochemical Methods: Fundamentals and Applications. 2nd Ed. Wiley, 2000. ISBN: 9780471043720.			
Course Website				
Additional Course Information	This course is offered every other year.			