Enquiry for Course Details

CHEM3241 Analytical chemistry II: chemical instrumentation (6 credits)		Academic Year	2023
Offering Department	Chemistry	Quota	104
Course Co-ordinator	Dr Y Li, Chemistry < yingli0e@hku.hk >		
Teachers Involved	(Dr I K Chu,Chemistry) (Dr Y Li,Chemistry)		
Course Objectives	To cover the basic principles and applications of chemical instrumentation. This course aims to provide working knowledge, in addition to the principles, of instruments that are commonly used in chemical laboratories.		
Course Contents & Topics	Optical methods: Beer's Law; UV-visible, infrared, and atomic spectrometry; fluorescence; atomic mass spectrometry; grating spectrometer; photon detectors and thermal detectors. Separation methods: partition; chromatography theories; high performance liquid chromatography (HPLC) and gas chromatography (GC); instrumental set up of HPLC and GC. Mass spectrometry: fundamental concept of mass spectrometry; electrospray ionization (ESI) and matrix-assisted laser desorption ionization (MALDI); time-of-flight (TOF) and quadrupole (Q) mass analyzers.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: explain the principles of the optical methods, separation methods, and mass spectrometry CLO 2: describe the basic experimental set up and the properties of the basic components of the instruments used in the laboratory classes CLO 3: apply experimental skills in chemical analysis including sample preparation, standard solution preparation, instrument calibration, and matrix effects correction (standard additions)		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM2241		
Course Status with Related Major/Minor /Professional Core	2023 Major in Chemistry (Core/Compulsory) 2023 Major in Chemistry (Intensive) (Core/Compulsory) 2023 Major in Environmental Science (Disciplinary Elective) 2023 Minor in Chemistry (Disciplinary Elective) 2022 Major in Chemistry (Core/Compulsory) 2022 Major in Chemistry (Intensive) (Core/Compulsory) 2022 Major in Environmental Science (Disciplinary Elective) 2022 Minor in Chemistry (Disciplinary Elective) 2021 Major in Chemistry (Core/Compulsory) 2021 Major in Chemistry (Intensive) (Core/Compulsory) 2021 Major in Environmental Science (Disciplinary Elective) 2021 Minor in Chemistry (Disciplinary Elective) 2021 Minor in Environmental Science (Disciplinary Elective) 2020 Major in Chemistry (Core/Compulsory) 2020 Major in Chemistry (Intensive) (Core/Compulsory) 2020 Major in Environmental Science (Disciplinary Elective) 2020 Minor in Chemistry (Disciplinary Elective) 2020 Minor in Environmental Science (Disciplinary Elective) 2019 Major in Chemistry (Core/Compulsory) 2019 Major in Chemistry (Intensive) (Core/Compulsory) 2019 Major in Environmental Science (Disciplinary Elective) 2019 Minor in Chemistry (Disciplinary Elective) 2019 Minor in Environmental Science (Disciplinary Elective)		
Course to PLO Mapping	2023 Major in Chemistry < PLO 2,3,4,5 > 2023 Major in Chemistry (Intensive) < PLO 2,3,4,5 > 2023 Major in Environmental Science < PLO 2,3,4 > 2022 Major in Chemistry < PLO 2,3,4,5 > 2022 Major in Chemistry (Intensive) < PLO 2,3,4,5 > 2022 Major in Environmental Science < PLO 2,3,4 > 2021 Major in Chemistry < PLO 2,3,4,5 > 2021 Major in Chemistry (Intensive) < PLO 2,3,4,5 > 2021 Major in Environmental Science < PLO 2,3,4 > 2020 Major in Chemistry < PLO 2,3,4,5 > 2020 Major in Chemistry (Intensive) < PLO 2,3,4,5 > 2020 Major in Environmental Science < PLO 2,3,4 > 2019 Major in Chemistry < PLO 2,3,4,5 > 2019 Major in Chemistry (Intensive) < PLO 2,3,4,5 > 2019 Major in Environmental Science < PLO 2,3,4 >		
Offer in 2023 - 2024	Y 1st sem	Examination	Dec
Offer in 2024 - 2025	Y		
Course Grade	A+ to F		

Grade Descriptors

A	- Demonstrate thorough grasp of the subject. - Show evidence of strong analytical abilities, logical and independent thinking, and ablility to apply knowledge to a wide range of complex, familiar and unfamiliar situations. - Demonstrate highly proficient lab skills and techniques and critical use of data and results to draw appropriate and insightful conclusions. - Demonstrate highly effective organization and presentation skills
B	- Demonstrate substantial grasp of the subject. - Show evidence of analytical abilities and logical thinking, some evidence of independent thinking, and ability to apply knowledge to familiar and some unfamiliar situations. - Demonstrate proficient lab skills and techniques and correct use of data and results to draw appropriate conclusions. - Demonstrate effective organization and presentation skills.
C	- Demonstrate general but incomplete grasp of the subject. - Show evidence of some analytical abilities and logical thinking, little evidence of independent thinking, and ability to apply knowledge to most familiar situations. - Demonstrate adequate lab skills and techniques and mostly correct but some erroneous use of data and results to draw appropriate conclusions. - Demonstrate moderately effective organization and presentation skills.
D	- Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. - Show evidence of limited analytical abilities, little or no evidence of independent thinking, and limited ability to apply knowledge to solve problems. - Demonstrate partially effective lab skills and techniques and limited ability to use data and results to draw appropriate conclusions. - Demonstrate limited or barely effective organization and presentation skills.
Fail	- Demonstrate little or no grasp of the knowledge and understanding of the subject. - Show little or no evidence of analytical abilities, logical and independent thinking, and very little or no ability to apply knowledge to solve problems. - Demonstrate minimally effective or ineffective lab skills and techniques and misuse of data and results and/or unable to draw appropriate conclusions. - Demonstrate incoherent organization and poor presentation skills.

Course Type

Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Laboratory		28
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		25	CLO 1,2,3
Test	(mid-term and in-class quiz)	15	CLO 1,2,3

Required/recommended reading and online materials

D.A. Skoog, F.K. Holler, S.R. Crouch: Principles of Instrumental Analysis (Thomson, latest edition).
D.A. Skoog, D.M. West, F.J. Holler, and S.R. Crouch: Fundamentals of Analytical Chemistry (Thomson, latest edition)

Course Website

NIL

Additional Course Information

Laboratory classes are mandatory. Students must complete ALL experiments and laboratory reports to pass this course.