

Enquiry for Course Details

CHEM4443 Integrated organic synthesis (6 credits)		Academic Year	2023
Offering Department	Chemistry	Quota	50
Course Co-ordinator	Dr Z X Huang, Chemistry < huangzx@hku.hk >		
Teachers Involved	(Dr Z X Huang, Chemistry)		
Course Objectives	To introduce aspects of modern organic reactions with relevance to and in the context of the synthesis of natural products, drugs and medicinal chemistry to provide an integrated approach to the subject, and to provide training in advanced organic laboratory skills, and further hands-on experience in synthesis and characterization, as preparation for graduate studies or research in organic chemistry.		
Course Contents & Topics	Building on the organic chemistry covered in the foundational courses CHEM1003 and CHEM2402, this course will present modern synthetic methods and synthetic planning. The course is organized into units based on target drug molecules. In each unit, the chemical biology of these compounds are briefly presented and the syntheses of these molecules are introduced, accompanied by in-depth discussions of the reactions involved with emphasis on their mechanisms, selectivity, stereochemistry, scope and limitations. Concept of synthetic design including retrosynthetic analysis, stereoselectivity and enantioselective control elements will be emphasized. A laboratory section provides training in the practical skills of synthesis.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
	CLO 1	understand the rationale, selectivities, and mechanisms of various reactions and reagents in organic chemistry	
	CLO 2	able to solve mechanistic and synthetic chemistry problems	
	CLO 3	perform organic synthesis experiments at an increased level of technical difficulty, using additional skills in experimental design and execution, spectroscopic analysis, and reporting of results	
	CLO 4	integrate lecture material and literature search, to learn chemistry independently	
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM3441; or Pass in CHEM3441 (without lab component) and CHEM3443		
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 1,2,3,4 > 2023 Major in Chemistry (Intensive) < PLO 1,2,3,4 > 2022 Major in Chemistry < PLO 1,2,3,4 > 2022 Major in Chemistry (Intensive) < PLO 1,2,3,4 > 2021 Major in Chemistry < PLO 1,2,3,4 > 2021 Major in Chemistry (Intensive) < PLO 1,2,3,4 > 2020 Major in Chemistry < PLO 1,2,3,4 > 2020 Major in Chemistry (Intensive) < PLO 1,2,3,4 > 2019 Major in Chemistry < PLO 1,2,3,4 > 2019 Major in Chemistry (Intensive) < PLO 1,2,3,4 >		
Offer in 2023 - 2024	Y	2nd sem	Examination May
Offer in 2024 - 2025	Y		
Course Grade	A+ to F		

Grade Descriptors	A	Demonstrate a thorough mastery at an advanced level of knowledge and understanding of concepts, principles, reactions and mechanisms related to synthetic organic chemistry. Show a strong ability to integrate knowledge and theory, and a strong ability to analyze novel synthetic organic chemistry situations and problems. Show a critical use of knowledge and data to apply to the solution of novel and complex synthetic problems. Demonstrate highly effective organization and application of lab skills and techniques in synthetic experiments.		
	B	Demonstrate a substantial command of knowledge and understanding of concepts, principles, reactions and mechanisms related to synthetic organic chemistry. Show evidence of ability to integrate knowledge and theory, and evidence of ability to analyze synthetic organic chemistry situations and problems. Show a correct use of knowledge and data to apply to the solution of some novel and most familiar synthetic problems. Demonstrate effective organization and application of lab skills and techniques in synthetic experiments.		
	C	Demonstrate a general but incomplete command of knowledge and understanding of concepts, principles, reactions and mechanisms related to synthetic organic chemistry. Show evidence of some ability to integrate knowledge and theory, and evidence of some ability to analyze synthetic organic chemistry situations and problems. Show a correct use of knowledge to apply to the solution of most familiar problems. Demonstrate moderately effective organization and application of lab skills and techniques in synthetic experiments.		
	D	Demonstrate a partial but limited command of knowledge and understanding of concepts, principles, reactions and mechanisms related to synthetic organic chemistry. Show evidence of a limited ability to integrate knowledge and theory, and a limited ability to analyze familiar situations and problems. Show some correct but erroneous use of knowledge to apply to the solution of most familiar problems. Demonstrate partially effective organization and application of lab skills and techniques in synthetic experiments.		
	Fail	Demonstrate little or no evidence of command of knowledge and understanding of concepts, principles, reactions and mechanisms related to synthetic organic chemistry. Show little or no evidence of ability to integrate knowledge and theory in synthetic organic chemistry, and little or no ability to analyze most familiar situations and problems. Show mostly erroneous use of knowledge to apply to the solution of familiar problems. Demonstrate minimally effective organization and application of lab skills and techniques in synthetic experiments.		
Course Type	Lecture with laboratory component course			
Course Teaching & Learning Activities	Activities	Details	No. of Hours	
	Laboratory		25	
	Lectures		24	
	Reading / Self study		100	
Assessment Methods and Weighting	Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
	Assignments	(Problem sets)	10	CLO 1,2,4
	Examination		50	CLO 1,2,3,4
	Laboratory reports	(Practicals & lab test)	25	CLO 1,2,3,4
	Test		15	CLO 1,2,4
Required/recommended reading and online materials	Reference Books: Organic synthesis, C. Willis, M. Wills, Oxford Science Publications Top drugs, top synthetic routes, J. Saunders, Oxford Science Publications			
Course Website	NIL			
Additional Course Information	Laboratory classes are mandatory. Students must complete ALL experiments and laboratory reports to pass this course. This course is also offered to RPg students, and the course code for RPg students is CHEM6111.			