

Enquiry for Course Details

CHEM4342 Organometallic chemistry (6 credits)		Academic Year	2023
Offering Department	Chemistry	Quota	32
Course Co-ordinator	Dr. J Z Liu, Chemistry < juliu@hku.hk >		
Teachers Involved	(Dr J He, Chemistry) (Dr. J Z Liu, Chemistry)		
Course Objectives	To give further, more detailed, treatment to organometallic chemistry mentioned in CHEM3341 Inorganic Chemistry II. The course also aims to introduce and familiarize students with advanced laboratory techniques, and to prepare students for graduate work in inorganic and organometallic chemistry.		
Course Contents & Topics	Lectures: Main group and transition metal organometallics. Transition metal cluster chemistry. Bonding, structure and reactivities of organometallics. Application of organometallics in organic synthesis and catalysis. Laboratory: To introduce and familiarize students with advanced laboratory techniques which include the synthesis and manipulation of air- and moisture- sensitive compounds, and their characterization by various spectroscopic methods.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
	CLO 1	understand the advanced principles and concepts in organometallic chemistry	
	CLO 2	demonstrate knowledge and understanding in the bonding, structure and reactivities of main group and transition metal organometallics, especially in transition metal clusters, metal alkyls, metal alkyldenes and metal alkyldynes	
	CLO 3	demonstrate knowledge and understanding in the application of organometallics in organic synthesis, polymerization and catalysis	
	CLO 4	demonstrate ability in advanced laboratory techniques including the synthesis and manipulation of air- and moisture- sensitive compounds, and their characterization by various spectroscopic methods	
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM3341		
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 2,3,4 > 2023 Major in Chemistry (Intensive) < PLO 2,3,4 > 2022 Major in Chemistry < PLO 2,3,4 > 2022 Major in Chemistry (Intensive) < PLO 2,3,4 > 2021 Major in Chemistry < PLO 2,3,4 > 2021 Major in Chemistry (Intensive) < PLO 2,3,4 > 2020 Major in Chemistry < PLO 2,3,4 > 2020 Major in Chemistry (Intensive) < PLO 2,3,4 > 2019 Major in Chemistry < PLO 2,3,4 > 2019 Major in Chemistry (Intensive) < 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	<p>A Demonstrate thorough knowledge and understanding of essential facts, concepts, principles, and theories relating to the more detailed and advanced treatment of organometallic chemistry, especially those related to structure, bonding and reactivities of main group and transition metal organometallics; transition metal cluster chemistry; and application of organometallics in organic synthesis and catalysis. Show strong ability to apply and integrate knowledge and theory relating to the advanced principles and concepts of organometallic chemistry. Show strong ability to analyze novel problems and critical use of data and experimental results to draw appropriate and insightful conclusions relating to the advanced principles and applications of organometallic chemistry. Demonstrate highly effective advanced laboratory skills and techniques, especially in the synthesis and manipulation of air- and moisture- sensitive compounds and their characterization by various spectroscopic methods.</p> <p>B Demonstrate substantial command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the more detailed and advanced treatment of organometallic chemistry, especially those related to structure, bonding and reactivities of main group and transition metal organometallics; transition metal cluster chemistry; and application of organometallics in organic synthesis and catalysis. Show evidence to apply and integrate knowledge and theory relating to the advanced principles and concepts of organometallic chemistry. Show evidence to analyze novel problems and correct use of data and experimental results to draw appropriate conclusions relating to the advanced principles and applications of organometallic chemistry. Demonstrate effective advanced laboratory skills and techniques, especially in the synthesis and manipulation of air- and moisture- sensitive compounds and their characterization by various spectroscopic methods.</p> <p>C Demonstrate general but incomplete command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the more detailed and advanced treatment of organometallic chemistry, especially those related to structure, bonding and reactivities of main group and transition metal organometallics; transition metal cluster chemistry; and application of organometallics in organic synthesis and catalysis. Show evidence of some abilities to apply and integrate knowledge and theory relating to the advanced principles and concepts of organometallic chemistry. Show ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to the advanced principles and applications of organometallic chemistry. Demonstrate moderately effective advanced laboratory skills and techniques, especially in the synthesis and manipulation of air- and moisture- sensitive compounds and their characterization by various spectroscopic methods.</p> <p>D Demonstrate partial but limited command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the more detailed and advanced treatment of organometallic chemistry, especially those related to structure, bonding and reactivities of main group and transition metal organometallics; transition metal cluster chemistry; and application of organometallics in organic synthesis and catalysis. Show evidence of limited abilities to apply and integrate knowledge and theory relating to the advanced principles and concepts of organometallic chemistry. Show limited ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to the advanced principles and applications of organometallic chemistry. Demonstrate partially effective advanced laboratory skills and techniques, especially in the synthesis and manipulation of air- and moisture- sensitive compounds and their characterization by various spectroscopic methods.</p> <p>Fail Demonstrate little or no evidence of command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the more detailed and advanced treatment of organometallic chemistry, especially those related to structure, bonding and reactivities of main group and transition metal organometallics; transition metal cluster chemistry; and application of organometallics in organic synthesis and catalysis. Show little or no evidence of abilities to apply and integrate knowledge and theory relating to the advanced principles and concepts of organometallic chemistry. Show little or no ability to analyze problems to most familiar situations and erroneous use of data and experimental results to draw appropriate conclusions relating to the advanced principles and applications of organometallic chemistry. Demonstrate minimally effective advanced laboratory skills and techniques, especially in the synthesis and manipulation of air- and moisture- sensitive compounds and their characterization by various spectroscopic methods.</p>																				
Course Type	Lecture with laboratory component course																				
Course Teaching & Learning Activities	<table border="1"> <thead> <tr> <th data-bbox="365 989 906 1031">Activities</th> <th data-bbox="906 989 1214 1031">Details</th> <th data-bbox="1214 989 1401 1031">No. of Hours</th> </tr> </thead> <tbody> <tr> <td data-bbox="365 1031 906 1073">Laboratory</td> <td data-bbox="906 1031 1214 1073"></td> <td data-bbox="1214 1031 1401 1073">30</td> </tr> <tr> <td data-bbox="365 1073 906 1115">Lectures</td> <td data-bbox="906 1073 1214 1115"></td> <td data-bbox="1214 1073 1401 1115">24</td> </tr> <tr> <td data-bbox="365 1115 906 1157">Tutorials</td> <td data-bbox="906 1115 1214 1157"></td> <td data-bbox="1214 1115 1401 1157">5</td> </tr> <tr> <td data-bbox="365 1157 906 1188">Reading / Self study</td> <td data-bbox="906 1157 1214 1188"></td> <td data-bbox="1214 1157 1401 1188">100</td> </tr> </tbody> </table>	Activities	Details	No. of Hours	Laboratory		30	Lectures		24	Tutorials		5	Reading / Self study		100					
Activities	Details	No. of Hours																			
Laboratory		30																			
Lectures		24																			
Tutorials		5																			
Reading / Self study		100																			
Assessment Methods and Weighting	<table border="1"> <thead> <tr> <th data-bbox="365 1188 683 1251">Methods</th> <th data-bbox="683 1188 992 1251">Details</th> <th data-bbox="992 1188 1179 1251">Weighting in final course grade (%)</th> <th data-bbox="1179 1188 1401 1251">Assessment Methods to CLO Mapping</th> </tr> </thead> <tbody> <tr> <td data-bbox="365 1251 683 1293">Assignments</td> <td data-bbox="683 1251 992 1293"></td> <td data-bbox="992 1251 1179 1293">15</td> <td data-bbox="1179 1251 1401 1293">CLO 1,2,3,4</td> </tr> <tr> <td data-bbox="365 1293 683 1335">Examination</td> <td data-bbox="683 1293 992 1335"></td> <td data-bbox="992 1293 1179 1335">50</td> <td data-bbox="1179 1293 1401 1335">CLO 1,2,3,4</td> </tr> <tr> <td data-bbox="365 1335 683 1377">Laboratory reports</td> <td data-bbox="683 1335 992 1377"></td> <td data-bbox="992 1335 1179 1377">20</td> <td data-bbox="1179 1335 1401 1377">CLO 1,2,3,4</td> </tr> <tr> <td data-bbox="365 1377 683 1409">Test</td> <td data-bbox="683 1377 992 1409"></td> <td data-bbox="992 1377 1179 1409">15</td> <td data-bbox="1179 1377 1401 1409">CLO 1,2,3,4</td> </tr> </tbody> </table>	Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping	Assignments		15	CLO 1,2,3,4	Examination		50	CLO 1,2,3,4	Laboratory reports		20	CLO 1,2,3,4	Test		15	CLO 1,2,3,4
Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping																		
Assignments		15	CLO 1,2,3,4																		
Examination		50	CLO 1,2,3,4																		
Laboratory reports		20	CLO 1,2,3,4																		
Test		15	CLO 1,2,3,4																		
Required/recommended reading and online materials	<p>R. H. Crabtree: The Organometallic Chemistry of the Transition Metals (Wiley, 2005, 4th ed.) C. Elschenbroich and A. Salzer: Organometallics - A Concise Introduction (VCH, 1992, 2nd revised edition) Reference to specialist texts and other published materials will be made throughout the course.</p>																				
Course Website	NIL																				
Additional Course Information	Laboratory classes are mandatory. Students must complete ALL experiments and laboratory reports to pass this course.																				