University of Gdańsk

Subject card

Subject name and code	Repetitory in mathematics, PG_00054868		
Field of study	Chemistry		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2024/2025
Education level	postgraduate studies	Subject group	Obligatory subject group in the field of study
Mode of study	full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	English not applicable
Semester of study	1	ECTS credits	3.0
Learning profile	academic	Assessment form	
Conducting unit	Faculty of Mathematics, Physics and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Adrian Kołodziejski	
	Teachers	Mehraveh Nikjoo	

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	30.0	0.0	0.0	0.0	30
	E-learning hours included: 0.0						

Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
	Number of study hours	30	5.0	40.0	75

Subject objectives	Explaining the most important concepts of linear algebra to the students. Teaching students how to linear algebra concepts apply to theoretical chemistry and quantum mechanics in particular

Learning outcomes

Course outcome	Subject outcome	Method of verification
[CHEMMU2_W08] Demonstrates knowledge of theoretical computational and IT methods used to solve problems in chemistry.	Student solves eigenproblems (matrix formulation), finds eigenvalues and eigenvectors,	[SW4] test/exam - oral or written
[CHEMMU2_W05] Has extended knowledge in the field of the specialisation studied.	Student verifies the self-adjoint character of an operator (or lack thereof), performs the orthogonalization of a basis set, transform vectors to other basis sets, applies Riesz representation theorem.	[SW4] test/exam - oral or written
[CHEMMU2_U02] Critically assesses the results of conducted, performed observations and theoretical calculations and discusses errors.	Student develops the skills of accurate and logical thinking and inference.	[SU5] implementation of a problem task
[CHEMMU2_K01] Knows the limitations of her/his own knowledge; understands the need for further education and can inspire other people to do so.	The student is able to apply the theorems and proof methods learned during the lecture, use the ideas and techniques presented in the proofs of the theorems and examples given during the lecture, provide applications of the learned theorems, solve practical problems related to the lecture material.	[SK4] test/exam - oral or written
[CHEMMU2_W07] Selects experimental and theoretical techniques to the extent necessary to understand the description and modelling of medium complexity chemical processes.	The student is able to apply the tools learned to solve problems in quantum mechanics.	[SW4] test/exam - oral or written
[CHEMMU2_U04] Applies acquired knowledge of chemistry and related scientific disciplines.	Student defines and describes basic terms of linear algebra. Recognizes a given vectors space, distinguishes between functionals and operators, recognizes and uses Hermitian operators.	[SU4] test/exam - oral or written
[CHEMMU2_U11] Communicates in English in accordance with the requirements specified for level B2 of the Common European Framework of Reference for Languages.	Student learns the principles of working safely, responsibly, and efficiently. Develops the ability to work in a team.	[SU6] demonstration of practical skills [SU8] observation of student's independent or team work

Subject contents

Vector spaces; subspaces; dimension, linear span and basis, real and complex spaces, spaces of functions, scalar product, norm, metric, functional, metric space, normed space, complete space, Hilbert space, dual space, linear form, antilinear form, bilinear form, Riesz representation theorem. Linear operator (linear transformation, linear mapping), matrix representation, eigenproblem (eigenvalues and eigenvectors), Hermitian operator (self-adjoint operator), spectrum of self-adjoint operators.

Prerequisites and co-requisites

Basic knowledge in mathematics

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
exam	50.0%	50.0%
test	50.0%	50.0%

Recommended reading

Basic literature	Lectures on linear algebra, I. M. Gelfand, Wiley & Sons, Inc., 2007 (ISBN 10: 0470296011, ISBN 13: 9780470296011)
Supplementary literature	Linear Algebra: Gateway to Mathematics, R. Messer, Pearson, 1997 (ISBN 10: 0065017285, ISBN 13: 9780065017281)
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed

Not applicable

Work placement

Not applicable

Document generated electronically. Does not require a seal or signature.