KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego

UNIA EUROPEJSKA
EUROPEJSKI FUNDUSZ SPOŁECZNY

Course title	ECTS code
Repetitory in mathematics	13.3.1286

Name of unit administrating study

Faculty of Mathematics, Physics and Informatics

Studies

faculty	field of study		
Wydział Chemii	Chemia	type	drugiego stopnia
		form	stacjonarne
		specialty	Digital Chemistry
		specialization	wszystkie

Teaching staff

dr Adrian Kołodziejski

Forms of classes, the realization and number of hours

Forms of classes

Auditorium classes

The realization of activities

classroom instruction

Number of hours

Auditorium classes: 30 hours

ECTS credits

3
classes - 30 h
student's own work – 30 h
tutorial classes – 15 h
Total: 75 h – 3 ECTS

The academic cycle

2023/2024 winter semester

Type of course

obligatory

Language of instruction

English

Teaching methods

Classes – multimedia presentation, in-class examples, exercises, solving problems.

Form and method of assessment and basic criteria for eveluation or examination requirements

Final evaluation

Graded credit

Assessment methods

Classes – the final grade is based on partial grades received during the semester for written reports and/or presentation of assignments.

The basic criteria for evaluation

Assessment criteria in accordance with the University of Gdańsk Study Regulations
Classes: the arithmetic mean of partial grades received during the semester for written reports on exercises and presentation of the final assignment; the main criteria for evaluation of reports are the correct answers to the questions in the exercise instructions.

Method of verifying required learning outcomes

Required courses and introductory requirements

A. Formal requirements
none

B. Prerequisites
basic knowledge in mathematics

Aims of education

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

Course contents

Vector spaces (with vector addition and scalar multiplication operations); 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.

Bibliography of literature

Literature required to pass the course
Lectures on linear algebra, I. M. Gelfand, Wiley & Sons, Inc., 2007 (ISBN 10: 0470296011, ISBN 13: 9780470296011)
Extracurricular readings
Linear Algebra: Gateway to Mathematics, R. Messer, Pearson, 1997 (ISBN 10: 0065017285, ISBN 13: 9780065017281)

The learning outcomes (for the field of study and specialization)

K_W05: has extended knowledge in the field of the linear algebra

K_W07: selects suitable mathematical tools to the extent necessary to understand the formulation of quantum mechanics

K_W08: demonstrates in-depth knowledge of linear functionals and operators used to solve problems in chemistry

K_U02: critically assesses the results of performed observations and theoretical calculations and discusses errors in the context of precise mathematical terms

K_U04: applies acquired knowledge of mathematics, chemistry and related scientific disciplines

K_U11: communicates in a foreign language in accordance with the requirements specified for level B2 of the Common European Framework of Reference for Languages and can use specialist terminology

K_K01: knows the limitations of her/his own knowledge; understands the need for further education

Knowledge

Student defines and describes basic terms of linear algebra. Recognizes a given vectors space, distinguishes between functionals and operators, recognizes and uses Hermitian operators.

Skills

Student solves eigenproblems (matrix formulation), finds eigenvalues and eigenvectors, 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.

Social competence

Student develops the skills of accurate and logical thinking and inference. Learns the principles of working safely, responsibly, and efficiently. Develops the ability to work in a team.

Contact

adrian.kolodziejski@gmail.com