Course: Unbounded linear operator

Teacher(s): Nebojša Dinčić

Status: elective

ECTS: 12

Prerequisites: none

Goal

Introducing the theory of unbounded linear operators and its important applications.

Outcomes

The student will acquire techniques from the theory of unbounded linear operators and will be able to proceed with research work on various problems where unbounded operators naturally appear.

Contents

Theoretical lectures

Unbounded linear operators. Closed operators. Spectra and resolvent of closed operator. Unbounded symmetric and self-adjoint operators.

Fundaments of a functional calculus. Spectral theorem for unbounded self-adjoint operators.

Differential operators. Sturm-Liouville operators. Partial differential operators.

Schrödinger operator: free Schrödinger operator; algebraic methods (Weyl relations, harmonic oscillator), onedimensional Schrödinger operator, one-particle Schrödinger operator.

Practical lectures

Examples and discussions following the theoretical results will be considered.

Recommended bibliography.

1. С. Курепа: Функционална анализа, елементи теорије оператора, Школска књига, Загреб, 1980.

2. В. Ракочевић: Функционална анализа, Научна књига, Београд, 1990.

3. E. Kreyszig: Introductory functional analysis with applications, Wiley, 1989.

4. G. Teschl, *Mathematical methods of quantum mechanics, with applications to Schrödinger operators*, American Mathematical Society, 2009.

5. J. Weidmann: Linear operators in Hilbert spaces, Springer, 1980.

Number of classes per week	Theoretical: 4	Practical:
Methods of teaching		
Group, individual, interactive.		
Knowledge rating (max 100 points)		
Knowledge estimation:		
Pre-exams: 50 points		
Final exam: 50 points		
Number of classes per week		