

Title: Locally defined operators

STATUS: OPTIONAL A

STRUCTURE : Lectures

CLASS HOURS: 30

GRADING: E

ECTS : 3

SEMESTER 2

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LECTURER

prof. dr hab. Janusz Matkowski

PRE-REQUISITES

Basis knowledge from real analysis

COURSE OBJECTIVES (LEARNING OUTCOMES)

The student will possess some knowledge of:

locally defined operators;

the representation formulas for locally defined operators acting between the spaces of differentiable functions;

Nemytskij composition operators;

Lipschitzian composition operators in some function spaces.

COURSE CONTENT

Locally defined operator (operators with memory), definition, properties and examples. Representation theorem for locally defined operators acting from the space n -times continuously functions into the space m -times continuously continuous functions, where both m and n are nonnegative integers. (Whitney extension theorem). One-sided locally defined operators and some open problems. Composition Nemytskij operators and their role in the theory of functional and differential equations. The Banach functions spaces in which the Lipschitzian composition operators have to be affine (the spaces of Lipschitzian functions, Hölder functions, differentiable functions, bounded variation functions) - consequences for applicability of fixed point methods in solving some nonlinear problems involving locally defined operators.

LITERATURE

1. J. Appell, Józef Banaś, N. Merentes, Bounded variation and around, Series in Nonlinear Analysis and Applications, 17, De Gruyter, Berlin – Boston, 2014.

2. J. Appell, P.P. Zabrejko, Nonlinear superposition operators, Cambridge Univ. Press, Cambridge 1990.

3. M. Kuczma, B. Choczewski, R. Ger, Iterative functional equations, Encyclopedia of Mathematics and Applications, Cambridge University Press, 1990.

4. J. Dugundji, A. Granas, Fixed point theory, Monografie Matematyczne 61, Polish Scientific Publishers, Warsaw, 1982.

ASSESSMENT

examination