Study programme(s): Mathematics (MD)

Level: PhD studies

Course title: Non-additive measures (AN-06)

Lecturer: Endre E. Pap

Status: elective

ECTS: 10

Requirements:

Learning objectives

Introduction to a unified theory of non-additive measures as a generalization of classical measure theory, with further applications especially in aggregation functions.

Learning outcomes

Acquiring full knowledge in contemporary non-additive measure theory and its applications.

Syllabus

General non-additive measures and special classes (zero additive, submeasures, probability functions, pseudo-additive, possibility measure). Chain and disjoint variation of set functions. Autocontinuity of a set function and topological connection with submeasures. Hahn and Jordan decomposition of a real generalized monotone set function. Saks's decomposition.

Choquet symmetric and asymmetric integrals and their properties. Convergence theorem. Sugeno's integral. Further generalizations of integrals with respect to non-additive measures. Representation of functionals via Choquet's and Sugeno's integral.

Aggregation functions representable via integrals with respect to non-additive measures. Moebius transform and Shapley value.

Literature

1. E. Pap, Null-Additive Set Functions, Kluwer Academic Publishers, Mathematics and Its Applications 337, Dordrecht/Boston/London, 1995, 315 pp.,
2. E. Pap, Handbook of Measure Theory (37 chapters), Volume I, II, Elsevier, North-Holland,2002, 1636p.
3. Denneberg, Nonadditive Measures, Kluwer, 1994.
4. E. Pap, Fazi mere i njihova primena, Novi Sad, 1999, 240 pp.
5. E.P. Klement, R. Mesiar, E. Pap, Triangular Norms, Trends in Logics 8, Kluwer Academic Publishers, Dordrecht/Boston/London, 2000, 385 pp..
6. E. P. Klement, R. Mesiar, E. Pap, Measure-based aggregation operators, Fuzzy Sets and Systems 142 (2004), 3-14.
7. M. Grabisch, J. L. Marichal, R. Mesiar, E. Pap, Aggregation Functions, 2007 (book in preparation).

Weekly teaching load				Other: 0
Lectures: 2	Exercises 0	Other forms of teaching: 0	Student research: 6	

Teaching methodology

Plenary lectures, problem sessions, independent presentations carried out by students.

Grading method (maximal number of points 100)			
Pre-exam obligations	**points**	**Final exam**	**points**
Colloquia	**50**	Oral exam	**50**