Course title: Lattices, Concept Lattices and Fuzzy Methods	**Neptun code: GEMAN422-a**
Course coordinator: Dr. Sándor Lajos Radeleczki, PhD, dr. habil., professor	
type of lesson and number of lessons: **lecture (2)**	
method of evaluation: colloquium	
curriculum location of the subject: (autumn/spring semester): autumn and spring	
pre-study conditions *(if any)*: GEMAN421-a Logic for Mathematics with Applications	

The task and purpose of the subject:

The task of the course is to familiarize doctoral students with the basics of mathematical and IT methods using partial ordering. The purpose of the subject is to identify problems that can be solved by such methods and developing aptitudes for their solution..

Course description:

Partially ordered sets, semilattices and lattices as partially ordered sets and algebraic structures, complete lattices and closure systems, information systems. Dedekind - Mc Neil completion of lattices. Formal contexts and concept lattices Context constructions and data bases. Representations of concept lattices, Sublattices, ideals and filters, distributive and modular lattices, Semimodular lattices and . the Jordan – Hölder theorem Congruences on lattices and their direct decomposition, Partition lattices, Subcontexts and complete congruences of a concept lattice. The decomposition and the construction methods of t concept lattices. Fuzzy sets, operations with fuzzy sets,, Fuzzy relations and functions, their composition. Fuzzy classification, and its applications in Group technology, Fuzzy numbers., The elements of Fuzzy logic. Fuzzy decision systems,i. Fuzzy contexts and fuzzy concept lattices.

Required literature:

1. B.A. Davey, H. A. Priestly, Introduction to lattices and Order, Cambridge Univ. Press, New York,-Mellbourne-Sydnay, 1990,
2. T.S. Blyth, Lattices and ordered structures, Springer, 2005.
3. Dubois, D., Prade, H., Fuzzy sets and systems, Theory and applications, Academic Press, New Yoork, London, toronto, 1980

Recommended literature:

1. Gratzer, G.: General lattice theory. Springer Science & Business Media, 2002
2. B. Ganter, R. Wille, Formal Concept Analyzis, Mathematical Foundations, Springer, 1999.