Course Specifications
From the academic year 2015-2016 up to and including the Course Specifications

Lecturers in academic year 2017-2018
Cornelis, Chris
WE02 lecturer-in-charge

Offered in the following programmes in 2017-2018

Dutch

Keywords
Fuzzy relations, fuzzy relational calculus, fuzzy topology, alternative models for representing imprecise information

Position of the course
The concept of a relation is fundamental, in a sense that sometimes science is described as the discovery of relations between objects, systems and structures. In this course we will give an overview of the recent developments in the classical relational calculus and its extension to imprecise relationships, the so-called fuzzy relational calculus. In parallel to defining and studying the theoretical concepts, we will illustrate them in many practical contexts. The term soft computing refers to a collection of models for representing and processing imprecise information. We will therefore also give a short overview of some of these models and describe their relationship with the most prominent among them, namely fuzzy set theory.
This fits within the following learning outcomes of the master programme: 1.1, 1.4, 1.7, 2.1, 2.3, 2.7, 3.2, 5.2.

Contents
1. Recent developments in relational calculus
1.1 Basic concepts
1.2 Operations
1.3 Classical images
1.4 New images and their properties
1.5 Special relations
1.6 Classical composition
1.7 New compositions and their properties

2. Fuzzy relational calculus
2.1 Basic concepts
2.2 Operations
2.3 Classical fuzzy images
2.4 New images and their properties
2.5 Approximate equality and similarity
2.6 Classical fuzzy composition
2.7 New compositions and their properties

3. Alternative models for representing imprecise information
3.1 Introduction of the alternative models (rough sets, fuzzy rough sets, interval-valued fuzzy sets, imprecise probabilities, ...)
3.2 Links between the different models

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4. Introduction to fuzzy topology

5. Applications, including for example to medical diagnosis, preference structures, image processing, approximate reasoning, data mining, artificial intelligence, expert systems, fuzzy control, decision making, ...

Initial competences
A basic knowledge of fuzzy set theory and a positive attitude w.r.t. a mathematical approach.

Final competences
1. The students should be familiar with fuzzy relational calculus and its applications.
2. Moreover, they should be aware of the existing models for representing imprecise information.
3. They should be capable of initiating independent research in these areas.

Conditions for credit contract
Access to this course unit via a credit contract is determined after successful competences assessment.

Conditions for exam contract
This course unit cannot be taken via an exam contract.

Teaching methods
Guided self-study, lecture, project.

Extra information on the teaching methods
The learning material is provided in Dutch and English.

Learning materials and price
The learning material is electronically available (free of charge), using the Minerva website.

References
R. Boete, Vaagrelaties - Fundamenten en Toepassingen, masterproef, Universiteit Gent, 2013 (in Dutch).

Course content-related study coaching
Students can ask questions during lectures or via e-mail.

Evaluation methods
end-of-term evaluation and continuous assessment

Examination methods in case of periodic evaluation during the first examination period
Written examination with open questions.

Examination methods in case of periodic evaluation during the second examination period
Written examination with open questions.

Examination methods in case of permanent evaluation
Assignment

Possibilities of retake in case of permanent evaluation
examination during the second examination period is possible.

Extra information on the examination methods
Theory: periodical evaluation.
Exercises: permanent evaluation.

Calculation of the examination mark
The project counts for 10 points out of 20, the written exam counts for 10 points out of 20.

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