

# Course Specifications

Valid in the academic year 2023-2024

# Geostatistics (1002454)

Course size	(nominal values; actual values ma	ny depend on pro	ogramme)		
Credits 5.0	Study time 150 h				
Course offerings and t	eaching methods in academic year 2	023-2024			
A (semester 2)	English	Gent	lec	lecture	
			ser	minar	
			pe	er teaching	
Lecturers in academic	year 2023-2024				
Van De Vijver, Ell	en		LA20	lecturer-in-charge	
Offered in the followi	ng programmes in 2023-2024			crdts	offering
Bachelor of Scier	nce in Bioscience Engineering			5	А
Master of Science in Sustainable Land Management(main subject Land and Croundwater				- r	٨

Bachelor of Science in Bioscience Engineering	5	А
Master of Science in Sustainable Land Management(main subject Land and Groundwater Management)	5	А
Master of Science in Sustainable Land Management(main subject Urban Land Engineering )	5	A
Master of Science in Statistical Data Analysis	5	А
Exchange Programme in Bioscience Engineering: Environmental Technology (master's level)	5	А
Exchange Programme in Bioscience Engineering: Land and Forest management (master's level)	5	A

# Teaching languages

English

# Keywords

Explorative data analysis, spatial variability, spatial interpolation and simulation, design-and model-based sampling

#### Position of the course

This course aims to transfer knowledge and insight in the process of a quantitative analysis of georeferenced data, with an emphasis on deterministic and probabilistic interpolation methods and the design of a supporting sampling strategy. Applications cover all disciplines where a continuous spatial inventory is required, for example, soil and water management, geology and environmental studies. This course is linked to the competences of the Bachelor by expanding insight in methods and techniques of statistical data analysis to a spatial context.

# Contents

- 1. Explorative data analysis: univariate, bivariate, spatial
- 2. Creating continuous surfaces from point data
- 3. Deterministic interpolation methods
- 4. Geostatistical theory and variogram modelling
- 5. Kriging: ordinary kriging, simple kriging & block kriging
- 6. Kriging with secondary information: cokriging, exhaustive secondary information
- 7. Kriging van categorische informatie
- 8. Uncertainty and decision support: sequential Gaussian simulations
- 9. Design- and model-based sampling

# Initial competences

Basic knowledge in statistics and mathematics and PC-based data processing (Excel).

# Final competences

- 1 Design an appropriate sampling strategy for different objectives of spatial data analysis
- 2 Perform an explorative data analysis of spatial data
- 3 Make spatially continuous maps using deterministic or stochastic interpolation methods, either using univariate data or by integrating secondary information
- 4 Calculate a variogram and model and interpret its structure
- 5 Perform a probability analysis of spatial simulation
- 6 Evaluate the quality of different interpolation methods

#### 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**

Seminar, Lecture, Peer teaching

# Extra information on the teaching methods

The theoretical classes are lectures. One of the theoretical learning contents is taught through microteaching: the students work in group on a PC experiment and then present their conclusions to their fellow students. The practical exercises exist in seminars in the form of PC exercises.

# Learning materials and price

A syllabus is available, including a tutorial for the practical exercises. Cost: 15 EUR

# References

Goovaerts, P. (1997). Geostatistics for Natural Resources Evaluation, New York, NY: Oxford University Press. Webster, R. & Oliver M. A. (2007). Geostatistics for Environmental Scientists. 2nd Edition. Chichester, United Kingdom: John Wiley & Sons Ltd. Webster, R. & Lark M. (2013). Field Sampling for Environmental Science and Management. Oxon, United Kingdom: Routledge.

# Course content-related study coaching

The theory lectures are supported by MS PowerPoint presentations with demonstrations of calculations. The exercises are given in PC-classes under supervision of AAP (in principle 1 student per PC, when a larger number of students is present, maximum 2 students per PC). Software used: Golden Software Surfer, SGeMS, MS Excel and basic text editor software.

#### Assessment moments

end-of-term and continuous assessment

#### Examination methods in case of periodic assessment during the first examination period

Written assessment with open-ended questions

#### Examination methods in case of periodic assessment during the second examination period

Written assessment with open-ended questions

#### Examination methods in case of permanent assessment

Skills test

# Possibilities of retake in case of permanent assessment

examination during the second examination period is possible

#### Extra information on the examination methods

PE1 and PE2 exist in a written examination with open questions, i.e. 7-8 knowledge and insight questions. NPE exists in a practical evaluation test using a PC.

#### Calculation of the examination mark

Final score = 75% written examination (PE) + 25% practical evaluation test (NPE) Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examiner.