GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2023-2024

Spatiotemporal Analysis and Modelling (C004177)

Course size *(nominal values; actual values may depend on programme)*

Credits 5.0 **Study time 150 h**

Course offerings and teaching methods in academic year 2023-2024

A (semester 1)	English	Gent	lecture
			group work
			independent work
			peer teaching

Lecturers in academic year 2023-2024

Van de Weghe, Nico	WE12	lecturer-in-charge

Offered in the following programmes in 2023-2024	**crdts**	**offering**
Master of Science in Teaching in Science and Technology(main subject Geography and Geomatics)	5	A
Bridging Programme Master of Science in Industrial Engineering and Operations Research(main subject Transport and Mobility Engineering)	5	A
Master of Science in Industrial Engineering and Operations Research(main subject Sustainable Mobility Analytics)	5	A
Master of Science in Industrial Engineering and Operations Research(main subject Transport and Mobility Engineering)	5	A
Master of Science in Bioscience Engineering: Forest and Nature Management	5	A
Master of Science in Bioscience Engineering: Land, Water and Climate	5	A
Master of Science in Geography and Geomatics	5	A
Exchange programme in Geography and Geomatics (master's level)	5	A

Teaching languages

English

Keywords

Geographical information science, GITechnology, spatiotemporal analysis, spatiotemporal data mining, spatiotemporal modelling, moving objects

Position of the course

Today, there are many methods and techniques that are used to build, manage, process, present, integrate and/or communicate spatiotemporal data.
In this course, these methods are studied from the research field of geographical information science. GIScience can be described as that part of information science that studies geographical information.
Specific attention goes to the research of moving objects (cars, bikes, pedestrians, visitors of events, animals, sporters, ...).

Contents

Theory and practical exercises about:
*Acquisition (Tracking)
-privacy and ethics
-positioning technologies
-positioning methods
-active versus passive tracking
*Data mining (Analysis)
-the KDD process
-taxonomy of basic data mining methods (clustering, association rule learning, sequential pattern discovery, outlier detection, visualization, classification)

-spatiotemporal data mining
*Modelling
-cellular automata
-multi-agent systems
-time geography
-QTC (Qualitative Trajectory Calculus)-invers + PDP (Point Descriptor Precedence)-invers

Initial competences

-Familiar with programming, preferably in Python.
-Successfully finished the course Geographic Information Systems or acquired the competences of this course in another way.

Final competences

1 Apply methods of GIScience.
2 Have a critical overview of international research in GIScience.
3 Know the recent developments in GIScience.
4 Analyse complex space(-time) phenomena.
5 Have a command of advanced concepts and knowledge of GIScience.
6 Contribute to the research of applications in geo-information science.
7 Individually formulate and analyse research questions concerning a research theme in GIScience.
8 Describe and use models and calculi in GIScience.
9 Critically reflect on one's own thinking within GIScience and related disciplines.
10 Represent a written report.
11 Orally present and defend research results.
12 Describe and reason about the interaction between GIScience and society.
13 independently perform scientific studies.

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

Group work, Lecture, Independent work, Peer teaching

Extra information on the teaching methods

- Lectures (25 hours)
- Independent work (10 hours)
- Group work (10 hours)
- Microteaching (2 hours)

Learning materials and price

Slides (via Ufora) + syllabus (via Ufora) + own notes

References

Course content-related study coaching

-By the practical assistants
-Interactive support using Ufora

Assessment moments

end-of-term and continuous assessment

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

Oral assessment

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

Oral assessment

Examination methods in case of permanent assessment

Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible

Calculation of the examination mark

- Non-periodical: 30%.

- Periodical: 70%.

Students need to pass for non-periodical as well as for periodocal evaluation.