

Computational Aspects of Transport and Mobility (E084470)

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

Credits 4.0 **Study time 120 h**

Course offerings and teaching methods in academic year 2023-2024

A (semester 1)	English	Gent	lecture seminar
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Lecturers in academic year 2023-2024

Audenaert, Pieter	TW05	lecturer-in-charge
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Offered in the following programmes in 2023-2024

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Bridging Programme Master of Science in Industrial Engineering and Operations Research(main subject Transport and Mobility Engineering)	4	A
Master of Science in Industrial Engineering and Operations Research(main subject Manufacturing and Supply Chain Engineering)	4	A
Master of Science in Industrial Engineering and Operations Research(main subject Transport and Mobility Engineering)	4	A

Teaching languages

English

Keywords

Transport, mobility, algorithms, mathematics

Position of the course

This course aims to study specific problems and their corresponding solutions in the field of (urban) transport and mobility. The focus is specifically on advanced algorithms and computational techniques, including state-of-the-art implementations and mathematical analyses.

Contents

- Different types of routingproblems (e.g. urban trafficflows, multimodal courier-services, TSP, VRP)
- Different types of routingalgorithms (e.g. multimodal, dynamic, statistic)
- Different implementation-techniques
 - Hierarchic algorithms (e.g. highway, contraction)
 - Datastructures (e.g. flags, clusters, geo-containers)
 - Combinations of the above (e.g. separators)
 - Other (e.g. ad-hoc, real-time, online, rolling-horizon, AI/ML)

Initial competences

Knowledge of discrete mathematics & graph theory, algorithms & datastructures, programming & implementation is essential.

Final competences

- 1 Being able to design and analyze advanced algorithms & datastructures in the field of transport and mobility
- 2 Being able to trade off quality of solutions and computational time during the design
- 3 Being able to implement the resulting datastructures and algorithms in an efficient way

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

Learning materials and price

Course material: English slides & notes.

References

- Relevant literature in 4OR, SIAM, Elsevier, Springer, ACM, IEEE,...
- Sanders, Datastructures and Algorithms, Springer
- Daganzo, Fundamentals of Transportation and Traffic Operations, Emerald Publishing Limited

Assessment moments

end-of-term 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

Possibilities of retake in case of permanent assessment

not applicable

Extra information on the examination methods

On the examination students will need to analyze problems and design adequate and efficient algorithms and datastructures for solving them.