

## Network Modelling and Design (E004720)

**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**

Offering	Language	Location	Teaching Methods	Hours
A (semester 2)	Dutch	Gent	project	15.0h
			guided self-study	12.5h
			seminar: coached exercises	2.5h
B (semester 2)	English	Gent	lecture	
			seminar	

**Lecturers in academic year 2023-2024**

Pickavet, Mario	TW05	lecturer-in-charge
Audenaert, Pieter	TW05	co-lecturer

**Offered in the following programmes in 2023-2024**

Programme	crdts	offering
<a href="#">Master of Science in Electrical Engineering (main subject Communication and Information Technology )</a>	4	B
<a href="#">Master of Science in Business Engineering(main subject Data Analytics)</a>	4	B
<a href="#">Master of Science in Industrial Engineering and Operations Research(main subject Manufacturing and Supply Chain Engineering)</a>	4	B
<a href="#">Master of Science in Business Engineering (Double Degree)(main subject Operations Management)</a>	4	B
<a href="#">Master of Science in Business Engineering(main subject Operations Management)</a>	4	B
<a href="#">Master of Science in Industrial Engineering and Operations Research(main subject Transport and Mobility Engineering)</a>	4	B
<a href="#">Master of Science in Computer Science Engineering</a>	4	B
<a href="#">Master of Science in Industrial Engineering and Operations Research</a>	4	A
<a href="#">Exchange Programme in Computer Science (master's level)</a>	4	B

**Teaching languages**

English, Dutch

**Keywords**

network problems, complex networks, graph models, network design

**Position of the course**

The goal of this course is to give insight in the wide variety of network problems and their mutual similarities/differences. To introduce the concepts, models and techniques to efficiently solve these problems.

**Contents**

- Overview and diversity of network problems
- Network modelling and analysis
- Network traversal and routing
- Design of random networks
- Models for social networks and communication networks
- Advanced topics and recent evolutions

**Initial competences**

Basic mathematical knowledge (graph theory) and programming skills

**Final competences**

- 1 Representing real-life network problems via mathematical formulation.
- 2 Identifying similarities and differences between varying network problems.
- 3 Knowing the key techniques for solving important network problems.

**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, Independent work

**Learning materials and price**

Syllabus (5-10 Euro)

**References**

van Steen, Martinus Richardus, Graph theory and complex networks: an introduction, [S.L.]: Maarten van Steen, 2010. ISBN: 978-9081540612 Location: T57.SY.0865  
Newman, M. E. J, Networks: an introduction, London : Oxford University Press. 2010. ISBN: 978-0199206650 Location: EBIB.EB02.PROJECTBOEK

**Course content-related study coaching****Assessment moments**

end-of-term and continuous assessment

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

Written assessment open-book

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

Written assessment open-book

**Examination methods in case of permanent assessment**

Oral assessment, Assignment

**Possibilities of retake in case of permanent assessment**

examination during the second examination period is possible in modified form

**Extra information on the examination methods**

During examination period: written open-book exam

During semester: graded project reports; graded oral presentation. Second chance: Possible in adapted form

Frequency: 1 project

**Calculation of the examination mark**

mpe = marks (on 20) on evaluation during examination period and mnpe = marks (on 20) on evaluation outside examination period

If (mpe smaller than 8 or mnpe smaller than 8)

then: score = minimum (mpe,mnpe)

else: **score = 0.5 x mpe + 0.5 x mnpe**