GHENT UNIVERSITY

Course Specifications

Valid in the academic year 2023-2024

Antennas and Propagation (E022230)

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

Credits 6.0 **Study time 180 h**

Course offerings and teaching methods in academic year 2023-2024

A (semester 1)	English	Gent	lecture	
			practical	
			seminar	
			independent work	0.0h
B (semester 1)	Dutch	Gent	seminar: coached exercises	7.5h
			guided self-study	37.5h
			lecture	0.0h
			practicum	2.5h
			project	20.0h

Lecturers in academic year 2023-2024

Rogier, Hendrik	TW05	lecturer-in-charge

Offered in the following programmes in 2023-2024	**crdts**	**offering**
Bridging Programme Master of Science in Electrical Engineering(main subject Communication and Information Technology)	6	A
Bridging Programme Master of Science in Electrical Engineering(main subject Electronic Circuits and Systems)	6	A
Master of Science in Electrical Engineering (main subject Communication and Information Technology)	6	A
Master of Science in Electromechanical Engineering(main subject Control Engineering and Automation)	6	A
Master of Science in Electromechanical Engineering(main subject Electrical Power Engineering)	6	A
Master of Science in Electrical Engineering (main subject Electronic Circuits and Systems)	6	A
Master of Science in Electromechanical Engineering(main subject Maritime Engineering)	6	A
Master of Science in Electromechanical Engineering(main subject Mechanical Construction)	6	A
Master of Science in Electromechanical Engineering(main subject Mechanical Energy Engineering)	6	A
European Master of Science in Nuclear Fusion and Engineering Physics	6	A
Master of Science in Electrical Engineering	6	B
Master of Science in Photonics Engineering	6	A

Teaching languages

English, Dutch

Keywords

antennas, radiowave propagation, smart antenna systems

Position of the course

This course provides an in-depth treatment of the physics of wireless interconnections, indoor and outdoor radiowave propagation and antennas. Special attention is devoted to mobile communication channels, antenna arrays and smart antenna systems.

Contents

- Chapter 1: Antennas
- Chapter 2: Radiowave propagation
- Chapter 3: Antenna arrays
- Chapter 4: Multibeam and adaptive antennas

Initial competences

Having succesfully completed the courses on "Applied Electromagnetics" and "Probability and Statistics", or having acquired the final competences provided by these courses in any other way.

Final competences

1 Computer-aided design antennas based on the Friis formula
2 Analyse full-wave problems based on the integral equation solved by the method of moments
3 Have insight into the radiation mechanisms of wire antennas, horn antennas, planar antennas and reflector antennas
4 Have insight into radiowave propagation in mobile communications systems, distinguish between path loss, schadowing, and fading, including frequency-selective fading
5 Have insight into the radiation mechanisms of antenna arrays, including mutual coupling and phased arrays
6 Mitigate fading by means of diversity, including polarisation diversity
7 Have insight into intelligent antenna systems, multiple input multiple output systems and beam steering

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, Practical, Independent work

Extra information on the teaching methods

Classroom lectures; Classroom problem solving sessions; Flipped classroom with online contact sessions; Project: Computer-aided design of antennas; Lab on antenna measurements

Learning materials and price

course notes (10EUR in print, free electronic version on UFora), english

References

C. A. Balanis, Antenna Theory: Analysis and Design, 3rd Edition, ISBN: 978-0-471-66782-7, John Wiley & Sons, Inc., Hoboken NJ, USA,May 2005.
Janaswamy, Ramakrishna, Radiowave propagation and smart antennas for wireless communications, Boston : Kluwer Academic Publishers, 2001. ISBN: 0-7923-7241-7 Location: TBBS.BESTELD

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

Oral assessment open-book, Written assessment open-book

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

Oral assessment open-book, Written assessment open-book

Examination methods in case of permanent assessment

Skills test, 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: oral open-book assessment; written open-book

assessment - problems
During semester: graded project reports; graded lab sessions. Second chance: Possible in adapted form

Calculation of the examination mark

Evaluation throughout semester as well as during examination period. Special conditions: 1/3 theory (oral exam - use of course material allowed) + 1/3 exercises (in writing - use of course material allowed) + 1/3 project project and lab reports. Students who eschew one or more parts of the assessment (part theory, part exercises and part project/lab) cannot obtain a pass mark for the course unit. Should the final mark be higher than 7/20, it will be reduced to the highest non-passable mark (i.e. 7/20). When the student obtains less than 8/20 for at least one of the components (part theory, part exercises and part project/lab), they can no longer pass the course unit as a whole. If the total score does turn out to be a mark of ten or more out of twenty, this is reduced to the highest fail mark (9/20).