

Antennas and Propagation (E022230)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

Course size (nominal values; actual values may depend on programme)
Credits 6.0 Study time 180 h Contact hrs 67.5 h

Course offerings and teaching methods in academic year 2020-2021

Offering	Language	Location	Teaching Methods	Hours
A (semester 1)	English	Gent	project	20.0 h
			seminar: coached	7.5 h
			exercises	
			lecture: plenary	7.5 h
			exercises	
B (semester 1)	Dutch		lecture	30.0 h
			practicum	2.5 h
			project	20.0 h
			guided self-study	37.5 h
			seminar: coached	7.5 h
			exercises	
			lecture	0.0 h
practicum	2.5 h			

Lecturers in academic year 2020-2021

Rogier, Hendrik TW05 lecturer-in-charge

Offered in the following programmes in 2020-2021

Programme	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, B
Master of Science in Electromechanical Engineering (main subject Electrical Power Engineering)	6	A, B
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, B
Master of Science in Electromechanical Engineering (main subject Mechanical Construction)	6	A, B
Master of Science in Electromechanical Engineering (main subject Mechanical Energy Engineering)	6	A, B
European Master of Science in Nuclear Fusion and Engineering Physics	6	A
Master of Science in Electrical Engineering	6	B
European Master of Science in Photonics	6	A
European Master of Science in Nuclear Fusion and Engineering Physics	6	A

Teaching languages

Dutch, English

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 successfully 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, shadowing, 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

Guided self-study, lecture, practicum, project, self-reliant study activities, lecture: plenary exercises, seminar: coached exercises, online lecture, online lecture: plenary exercises, online lecture: response lecture, online project

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), 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

Evaluation methods

end-of-term evaluation and continuous assessment

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

Written examination, open book examination, oral examination

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

Written examination, open book examination, oral examination

Examination methods in case of permanent evaluation

Skills test, report

Possibilities of retake in case of permanent evaluation

(Approved)

examination during the second examination period is possible in modified form

Extra information on the examination methods

During examination period: oral open-book exam; written open-book exam - 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 and lab reports.

However, at least 4/10 must be obtained for each part (part theory, part exercises and part project/lab). If this is not the case, the total score drops to the lowest score of all the separate parts.