GHENT UNIVERSITY

Course Specifications

Valid in the academic year 2023-2024

Data Communication (E731028)

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

Credits 3.0 **Study time 90 h**

Course offerings and teaching methods in academic year 2023-2024

A (semester 2)	Dutch	Gent	lecture

Lecturers in academic year 2023-2024

Verhaevert, Jo	TW05	lecturer-in-charge

Offered in the following programmes in 2023-2024	crdts	offering
Bachelor of Science in Engineering Technology(main subject Electronics and ICT Engineering Technology)	3	A
Bachelor of Science in Engineering Technology(main subject Information Engineering Technology)	3	A
Linking Course Master of Science in Electronics and ICT Engineering Technology(main subject Electronics Engineering)	3	A
Linking Course Master of Science in Electronics and ICT Engineering Technology(main subject Embedded Systems)	3	A
Linking Course Master of Science in Electronics and ICT Engineering Technology(main subject ICT)	3	A
Preparatory Course Master of Science in Electronics and ICT Engineering Technology(main subject Electronics Engineering)	3	A
Preparatory Course Master of Science in Electronics and ICT Engineering Technology(main subject Embedded Systems)	3	A
Preparatory Course Master of Science in Electronics and ICT Engineering Technology(main subject ICT)	3	A
Preparatory Course Master of Science in Information Engineering Technology	3	A

Teaching languages

Dutch

Keywords

Data communication

Position of the course

The course has the following objectives:

- Learn the basics and concepts in order to gain insight in modern communication systems
- Understand and be able to analyse different real life case studies: telephone networks, xDSL, cable networks and backbone networks

Contents

- Setting and history of communication, description of communication systems, types of communication (types of information, geographical spreading, direction of communication, connection types, topology), OSI reference model
- Analogue and digital signals, bandwidth, sampling (Nyquist theorem) and quantising, PAM, PCM, DPCM, DM, ADPCM...
- Channel properties: transfer function, noise (types of noise, noise figure, noise temperature), signal to noise ratio, channel capacity of Shannon, amplitude distortion and phase distortion
- Electromagnetic propagation, guided waves on telephone lines (distributed parameters, attenuation), on coaxial cable (attenuation) and on optical fibre (internal reflection, fibre types, attenuation)
- Digital communication using base band channel: choice of wave form, choice of

pulse form (Unipolar-Bipolar, NRZ-RZ, AMI, Manchester…), more than 2 different wave forms and digital communication using band pass channel (ASK, FSK, PSK, QAM), constellation diagram
- Multiplexing and multiple access: frequency, wave length, time (PDH, SDH, SONET), space, code (DSSS, FHSS) and combinations thereof
- Case study PSTN: analogue telephony, voice band modem, ISDN
- Case study xDSL: restrictions of copper line for xDSL, POTS-splitter, FDM-EC modems, modulation techniques, architecture, HDSL-SHDSL-ADSL2-ADSL2+-RADSL-VDSL-VDSL2
- Case study cable networks: classic cable network, two-way traffic via cable network, HFC, DOCSIS, multiple access control, cable telephone networks
- Case study computer networks: ATM, FDDI, Ethernet

Initial competences

Builds upon certain final competences of the courses 'Signals and systems II'.

Final competences

1 Understand and explain the basics of communication (with e.g. analogue and digital signals)
2 Analyse and interpret channel properties
3 Apply practically electromagnetic wave propagation: twisted pair, coax and fibre
4 Analyse different types of digital communication: ASK, FSK, PSK, QAM, multiplexing and multiple access
5 Understand and explain the design choices of modern communication networks (telephony, xDSL, HFC and backbone)

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

Lecture

Learning materials and price

- Syllabus (7 euro)
- Hand-outs of the slides and additional documentation on the electronic learning environment

References

Course content-related study coaching

The lecturer is available for further information via various channels (during and after the course, via e-mail or by appointment).

Assessment moments

end-of-term 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

Possibilities of retake in case of permanent assessment

not applicable

Calculation of the examination mark

Written assessment open-book: 100%