Course Specifications
Valid as from the academic year 2019-2020

Course: Data Communication (E731028)

Valid as from the academic year 2019-2020

Course offerings and teaching methods in academic year 2019-2020
A (semester 2) Dutch lecture 24.0 h

Lecturers in academic year 2019-2020
Verhaevert, Jo
TW05 lecturer-in-charge

Offered in the following programmes in 2019-2020
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 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 ICT) 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 telephony: PSTN, voice band modem
- Case study digital telephony: ISDN, ATM, DECT

Contact hrs
Studly time 90 h
Credits 3.0
Course size (nominal values; actual values may depend on programme)

(Arriveded)
• Case study xDSL: restrictions of copper line for xDSL, POTS-splitter, FDM-EC modems, modulation techniques, architecture, HDSL-SHDSL-ADSL2-ADSL2+-RADSL-VDSDL-VDSL2
• Case study cable networks: classic cable network, two-way traffic via cable network, HFC, DOCSIS, multiple access control, cable telephone networks
• Case study backbone networks: FDDI, Ethernet

Initial competences
Builds upon certain final competences of the courses 'Fysica II' and ‘Signalen en Systemen’

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).

Evaluation methods
end-of-term evaluation

Examination methods in case of periodic evaluation during the first examination period
Written examination, open book examination

Examination methods in case of periodic evaluation during the second examination period
Written examination, open book examination

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation
not applicable

Extra information on the examination methods
Written open book examination

Calculation of the examination mark
Written examination: 100%

(Approved)