Technology
Arts Sciences
TH Köln

Course
UT - Digital Communications

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General information

Long name	Digital Communications
Approving CModule	UT_BaET, UT_BaTIN
Responsible	Prof. Dr. Uwe Dettmar Professor Fakultät IME
Level	Bachelor
Semester in the year	summer semester
Duration	Semester
Hours in self-study	60
ECTS	5
Professors	Prof. Dr. Uwe Dettmar Professor Fakultät IME
Requirements	Students should have basic knowldege in algebra, linear algebra, and stochastics as well as the capabilities to write small programs in a standard programming language. In the framework of this module Python and Matlab/Octave is used for simulations. They should understand physical quantities and units and have basic capabilties in the application of complex AC calculation. Basic knowledge from signal theory and Fourier tranform are required, too.
Language	German, English if necessary
Separate final exam	Yes

Final exam

Details

Form: written exam (optional: oral examination)
- Duration: 90 minutes
- Assignment: in general 3 problems with subtasks, which test on different taxonomies
- different taxonomies are rated according to their complexity and difficulty

Minimum standard

Basic knowledge can be adequately applied to known and related problems. The execution is in parts faulty. (4,0)

Exam Type

Form: written exam (optional: oral examination)
- Duration: 90 minutes
- Assignment: in general 3 problems with subtasks, which test on different taxonomies
- different taxonomies are rated according to their complexity and difficulty

Lecture / Exercises

Learning goals

Knowledge

The underlying concept of this module is a combination of lecture and tutorial. After a lecture block the subjects taught are actively trained using Matlab/Octave and Python programs.

Syllabus:
- Short history of telecommuniations
- models and content of communications
- basic terms
- signals, systems, and modulation
- multicarrier
- channels and elements of a transmission link
- decision theory
- link budget calculation

Students shall deepen their knowledge by self-study of literature and internet ressources and discuss their results in small learning groups as teamwork.

Skills

By working with small exercises and programs during the presence time students are able to actively train their knowledge. More extensive problems are solved and discussed in the second part of the lesson to activate the student's capabilities to solve relevant problems.

Students further learn
- to analyze communication systems and to estimate their performance
- to compare and rate algorithms and methods
- to apply their knowledge to technical problems

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Lecture	2
Exercises (whole course)	2
Exercises (shared course)	0
Tutorial (voluntary)	0

Separate exam

none

Practical training

Learning goals

Skills

Students accomplish lab problems using Jupyter Notebooks.
Simulations are run with the help of complete or partly complete Python programs. Students collect and present the data by graphical representation.

Matlab in combination with the Communications Toolbox ist used for more extensive simulation tasks.

- students train their capabilities to solve technical problems by the help of programms
- students analyze and simulate digital communication systems and rate their performance
- they train their self-management and their problem focused thinking and acting
- students practice solving problems in a team and train their communication skills.

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Practical training	1
Tutorial (voluntary)	0

Separate exam

none