

Course

QKC - Source and Channel Coding

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^ General information

Long name	Source and Channel Coding
Approving CModule	QKC BaET , QKC BaTIN
Responsible	Prof. Dr. Uwe Dettmar Professor Fakultät IME
Level	Bachelor
Semester in the year	winter semester
Duration	Semester
Hours in self-study	60
ECTS	5
Professors	Prof. Dr. Uwe Dettmar Professor Fakultät IME
Requirements	Students should have basic knowledge 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.
Language	German
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 from lecture and tutorial. After a lecture block of approximately 20 minutes) the subjects taught are actively trained using Matlab/Octave and Python programs.

Syllabus:

- basics on source and channel coding and cryptography
- system theoretical description of a transmission system
- basics math for source and channel coding and cryptography
- basics on information theory related to source and channel coding
- examples for source and block codes
- aspects of IT security
- public and private key cryptography
- cryptological protocols

These subjects are presented during the lecture. Students shall deepen their knowledge by self-study of literature and internet resources and discuss their results in small learning groups as a teamwork.

Skills

By the help of 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 course 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)	0
Exercises (shared course)	2
Tutorial (voluntary)	1

Separate exam

none

^ Practical training

Learning goals

Skills

Students accomplish lab problems from source and channel coding using Jupyter Notebooks. Simulations are provide as 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 programming
- students analyze and simulate digital communication systems and rate their performance
- they train their self-management and their problem focused thinking and acting
- students train solving problems in a team and their communication skills

Expenditure classroom teaching

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

Separate exam

none