

Course Manual QKC

Source and Channel Coding

Version: 2 | Last Change: 06.08.2019 21:56 | Draft: 0 | Status: vom verantwortlichen Dozent freigegeben

– General information

Long name Source and Channel Coding

Approving CModule [QKC BaET](#), [QKC BaTIN](#)

Responsible Prof. Dr. Uwe Dettmar
Professor Fakultät IME

Valid from summer semester 2022

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

Literature

BOSSERT, M. : Einführung in die Nachrichtentechnik. Oldenbourg Verlag, 2012.

BOSSERT, M. : Kanalcodierung. Oldenbourg Wissenschaftsverlag GmbH, 2013.

NEUBAUER, A. : Informationstheorie und Quellencodierung. Wilburgstetten : Schlembach, 2006.

PROAKIS, J. G. ; SALEHI, M. : Digital Communications. 5. McGraw-Hill, 2008.

SAYOOD, K. : Introduction to data compression. third. Elsevier Morgan Kaufmann, 2000.

MEYER, M. : Kommunikationstechnik. 4. Vieweg und Teubner, 2019.

SKLAR, B. : Digital Communications. Prentice Hall PTR, 2001

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

EN Klausur

– Lecture / Exercises

Learning goals

Goal type	Description
Knowledge	<p>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.</p> <p>Syllabus:</p> <ul style="list-style-type: none">- basics on source and channel coding and cryptology- 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 <p>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.</p>
Skills	<p>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.</p> <p>Students further learn</p> <ul style="list-style-type: none">- to analyze communication systems and to estimate their performance- to compare and rate algorithms and methods- to apply their knowledge to technical problems

Special requirements

none

Accompanying material

lecture slides, problems and solutions, course page in the Ilias learning platform, mini tests, collection of links, Matlab and Python programs, Jupyter Notebooks

Separate exam

No

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Lecture	2
Exercises (whole course)	0
Exercises (shared course)	2
Tutorial (voluntary)	1

– Practical training

Learning goals

Goal type	Description
Skills	<p>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.</p> <p>Matlab in combination with the Communications Toolbox ist used for more extensive simulation tasks.</p> <ul style="list-style-type: none">- 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

Special requirements

introductory lab tests (in the Ilias system)

Accompanying material	- lab manuals - tests
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Separate exam	No
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Expenditure classroom teaching

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