Technology
Arts Sciences
TH Köln

Course
SIG - Signal Processing

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∧ General information

Long name	Signal Processing
Approving CModule	SIG_BaTIN
Responsible	Prof. Dr. Rainer Bartz Professor Fakultät IME
Level	Bachelor
Semester in the year	winter semester
Duration	Semester
Hours in self-study	78
ECTS	5
Professors	Prof. Dr. Rainer Bartz Professor Fakultät IME
Requirements	elementary functions (polynomial, rational, trigonometric, exponential functions); sequences and series, limits, l'Hospital; polynomial division, partial fraction expansion; systems of linear equations; complex calculus, complex-valued functions, polar and cartesian representation, Euler's formulas; basic programming skills (C preferred); constants, variables, functions, arrays; data types, loops, if..else; structures, arrays of structures; bitwise operators; dada type conversion, registers, number representations; realtime processing; compiler, linker, debugger
Language	German

Separate final exam	Yes

Final exam

Details

written exam

Minimum standard

50%

Exam Type

written exam

^ Lecture / Exercises

Learning goals

Knowledge

basic concepts (signal, system, characteristics)

signals:
discrete time reference signals (impulse, step, ...) and their characteristics
Fourier series of discrete-time signals
z-transform of discrete-time signals

systems; especially discrete-time (DT) LTI sytems
signal transmission
difference equations and block diagrams
DT convolution
recursive numerical approach
z-transform of a delay element
the z-transfer function
responses on reference signals
general system responses
pole-zero plot and stability
canonical system structures: DF1, DF2
FIR and IIR filter systems; comparison

Skills

students acquire fundamental knowledge on theory and applications of discrete-time signals and systems

they understand the behavior of typical systems

they can apply algorithms for convolution, z-transform, and others

they are able to understand a system model, and to analyze it in time and frequency domain

they can apply system theory to real-world systems

students can implement a discrete-time system based on given requirements

Expenditure classroom teaching

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

Separate exam

^ Practical training

Learning goals

Knowledge

sampling input and output signals of a continuous-time (CT) system

basic algorithms of signal processing

software implementation of a DT system from a requirements specification

Skills

students can use state of the art tools for system simulation, and implementation

they understand the relationship between CT and DT systems and can explain the most important effects

students are able to solve problems in small teams

they can implement basic algorithms for signal processing

- based on Matlab scripts

- on a DSP platform (Texas Instruments C6713 with Code Composer Studio)

Expenditure classroom teaching

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

Separate exam