Technology
Arts Sciences
TH Köln

Course Manual 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
Valid from	winter semester 2021/22
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

Literature

Carlson, G. E.: Signal and Linear System Analysis, John Wiley & Sons, Inc.

Final exam

Details	written exam
Minimum standard	50%
Exam Type	EN Klausur

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

− Lecture / Exercises

Learning goals

Goal type	Description
Knowledge	basic concepts (signal, system, characteristics)
Knowledge	signals: discrete time reference signals (impulse, step, ...) and their characteristics Fourier series of discrete-time signals z-transform of discrete-time signals
Knowledge	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
Skills	they understand the behavior of typical systems
Skills	they can apply algorithms for convolution, z-transform, and others
Skills	they are able to understand a system model, and to analyze it in time and frequency domain
Skills	they can apply system theory to real-world systems
Skills	students can implement a discrete-time system based on given requirements

Special requirements

Requirements are documented by MA1, PI1, MA2, GSP.

Accompanying material	compendium with all relevant contents is available (English language) some additional presentation slides electronically available, exercises and solutions electronically available (German language)
Separate exam	No

Expenditure classroom teaching

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

− Practical training

Learning goals

Goal type	Description
Knowledge	sampling input and output signals of a continuous-time (CT) system
Knowledge	basic algorithms of signal processing
Knowledge	software implementation of a DT system from a requirements specification
Skills	students can use state of the art tools for system simulation, and implementation
Skills	they understand the relationship between CT and DT systems and can explain the most important effects
Skills	students are able to solve problems in small teams
Skills	they can implement basic algorithms for signal processing - based on Matlab scripts - on a DSP platform (Texas Instruments C6713 with Code Composer Studio)

Special requirements

Requirements are documented by MA1, PI1, MA2, GSP.

Accompanying material	introduction to the lab components electronically available, specification of the lab tasks electronically available, documentation on the tools and software environments electronically available
Separate exam	No

Expenditure classroom teaching

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