Valid from 2024.HS

Module description: Digital Technology

Module Code	t.BA.ET.DT.19HS
ECTS Credits	2
Language of Instruction/Examination	German
Organizational Unit	InES
Module Coordinator	Dominique Cachin
Legal Framework	The module description is part of the legal basis in addition to the general academic regulations. It is binding. During the first week of the semester a written and communicated supplement can specify the module description in more detail.
Module Characteristic	Type 1a 2 lecture lessons per semester week and class
Module Description	Design of combinational logic circuits with digital gates. Calculating with binary and hexadecimal numbers. Apply adding logic. Creating truth tables and temporal representation of digital signals. Design of sequential circuits and their description in VHDL.
Module Content	**Introduction to digital technology and combinatorial and sequential logic.** **Number systems (binary, hexadecimal, representation of negative numbers (one's complement, two's complement), arithmetic with negative numbers).** **Logical functions and gates: INV, AND, OR, NAND, NOR, XOR.** **Combinatorial logic: Logical operations, combinatorial logic.** **Truth table and basic combinatorial circuits: Half/full adder, subtractor, multiplexer and demultiplexer, decoder (e.g. BCD => 7-segment).** **Sequential logic: flip-flops, synchronous circuits, counters, shift registers, introduction to Moore machine.** **Introduction to textual hardware description in VHDL (single entity and architecture, process with combinatorial and clocked logic).** **Analysing digital circuits on the time level (signal tap).**
Prerequisite Knowledge	Basics of mathematics, physics and German at vocational baccalaureate level

Module description: Digital Technology

Learning Objectives (Competences)

Students...	Competencies	Taxonomies
You know and understand simple combinational basic circuits with digital gates, you can interpret a schema and master the realization of simple functions as well as the creation and interpretation of truth tables.	M, F	K2, K3
You can describe digital systems in various logical forms.	F, M	K2, K3
You can calculate with binary and hexadecimal numbers.	M, F	K2, K3, K4
You know and understand simple adder logic (half adder and full adder).	F, M	K2, K3, K4
You know and understand simple sequential logic circuits (counters, shift registers, automats) and can analyze and design them.	M, F	K2, K3
You can describe the function of a circuit in the time domain (time history diagrams).	F	K2
You can describe and synthesize simple digital basic circuits textually with VHDL.	M, F	K2, K3
You can visualize a digital circuit with FPGA tools in the time domain.	M, F	K2

Performance Assessment

End-of-module exam	Assessment	Length (min.)	Weighting	Form
written exam	Grade	90	75	acc. to module agreement

Performance assessment during the semester	Assessment	Length (min.)	Weighting	Form
written exam	Grade	45	10	acc. to module agreement
Laboratory exercise *Assessment of the execution*	Grade		10	acc. to module agreement
Mini-project *Assessment of the execution*	Grade		5	acc. to module agreement

Classroom Attendance Requirement

None

Learning material

- Fricke, K. (2014). Digitaltechnik: Lehr und Übungsbuch für Elektrotechniker und Informatiker. Springer. ISBN 383481783X.
- Reichard, J. (2009). Digitaltechnik, Eine Einführung mit VHDL. De Gruyter Oldenbourg. ISBN 3486589083.

Comments