Module title		SM Code
Digital Electronics		**DT**
Module lecturer	**Faculty**	
Prof. Dr. Detlef Jantz	Electrical Engineering and Information Technology	
Module language	**Number of SWS / WSH**	**ETCS credits**
English	4 SWS / WSH	5
Teaching format		
Seminar-based teaching with approx. 10-15% exercises		

Semester according to the study plan	
1st semester (Bachelor)	
Attendance/classroom hours	**Additional independent study**
60 hours	Preparation and follow-up work: 60 hours Exam preparation: 30 hours
Type of examination / Requirements for the award of the credit points	
Written exam: 90 minutes	

Teaching content

- Number theory of bit vectors as a technical application of binary numbers
- Digital circuits (gates, signals, logic families, output circuits)
- Combinational logic design (circuit networks, examples)
- Design of sequential logic (circuit networks, state machines, examples)
- Diagrams and forms for representing specific circuit aspects
- Structural design of programmable logic devices
- Fundamentals of programmable logic using VHDL

Learning objective: Professional competence

After successfully completing this module, students will be able to

- analyse, design, minimise and optimise digital circuits using Boolean algebra (3)
- confidently use basic logic functions in various technical development contexts in hardware and software (3)
- understand the structure of microcomputer components and other digital components for further study in subsequent courses (2)
- recognise, analyse and expand fundamental digital circuits (1)
- analyse and understand the modular structure of basic digital circuits (2)
- use digital circuits based on two-valued logic in all forms (2)
- synthesise and simulate digital circuits in VHDL, prepared for further study in the practical course (2)
- express simple processes by means of programming in VHDL (3)

Literature

Recommended reading

- Beuth, K. (2007). *Digitaltechnik: Elektronik 4*. Vogel
- Siemers, C., & Sikora, A. (2022). *Taschenbuch Digitaltechnik*. Hanser
- Reichardt, J. (2011). *Lehrbuch Digitaltechnik : eine Einführung mit VHDL*. Oldenbourg

The numbers in brackets indicate the levels to be achieved: (1)-know | (2)-can | (3)-understand and apply