

Module Handbook

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Module INF-82-58-M-2

Foundations of Technical Computer Science (M, 8.0 LP)

Module Identification

Module Number	Module Name	CP (Effort)
INF-82-58-M-2	<i>Foundations of Technical Computer Science</i>	8.0 CP (240 h)

Basedata

CP, Effort	8.0 CP = 240 h
Position of the semester	1 Sem. in SuSe
Level	[2] Bachelor (Fundamentals)
Language	[DE] German
Module Manager	Schürmann, Bernd, PD Dr.-Ing. (WMA DEPT: INF, GS)
Lecturers	Grimm, Christoph, Prof. Dr. (PROF DEPT: INF) Schneider, Klaus, Prof. Dr. (PROF DEPT: INF) Schürmann, Bernd, PD Dr.-Ing. (WMA DEPT: INF, GS)
Area of study	[INF-LA] Teacher Education
Reference course of study	[INF-31.79-SG] B.Ed. LaGR Computer Science
Lifecycle-State	[NORM] Active

Notice

The operating system and system software topics are shortly addressed by this module and are covered in more detail in course [INF-02-10-K-2] Computer Organization and System Software.

Courses

Type/SWS	Course Number	Choice in Module-Part	SL	PL	CP	Sem.
4V+2U	INF-02-09-K-2	P	U-Schein	PL1	8.0	SuSe

- About [INF-02-09-K-2]: Title: "Digital Systems and Computer Architecture"; Presence-Time: 84 h; Self-Study: 156 h
- About [INF-02-09-K-2]: The study achievement "[U-Schein] proof of successful participation in the exercise classes (ungraded)" must be obtained.
 - It is a prerequisite for the examination for PL1.

Examination achievement PL1

- Form of examination: **written exam (Klausur) (120-150 Min.)**
- Examination Frequency: each semester
- Examination number: 60209 ("Digital Systems and Computer Architecture")

Evaluation of grades

The grade of the module examination is also the module grade.

Contents

- Representation of information by data
- Number representations and arithmetic
- Design and function of computers, microarchitecture of a processor
- Instruction interpretation, instruction pipelining
- Memory hierarchy; input/output
- Digital and electrical engineering basics (including Boolean algebra, switching algebra, combinatorial and sequential logic, basics of circuits, combinational networks and their realization, sequential circuits)
- Assembler programming and its application for the realization of higher programming languages
- Binders and loaders, interrupt structures and synchronization, process management;
- Input/output
- Main memory management, file management, protection mechanisms
- Foundations of operating systems

Competencies / intended learning achievements

The students

- have a basic understanding of how a single processor computer works;
- know its basic structure, know how to interpret an instruction, and know some optimization techniques;
- know the electrotechnical realisation of circuits as well as the input and output by sensors and actuators in technical systems;
- are able to analyze the performance of computers;
- are able to design the elements of the computer, write small assembler programs and understand the essential functions of an operating system.

Literature

From [INF-02-09-K-2] Digital Systems and Computer Architecture:

- Skript.
- S.P. Dandamudi, Fundamentals of Computer Organization and Design, Springer, 2002.
- Giovanni De Micheli, Synthesis and Optimization of Digital Circuits, McGraw-Hill, 1994.

- Gary D. Hachtel and Fabio Somenzi, Logic Synthesis and Verification Algorithms, Kluwer, 1996.
- C. Hamacher, Z. Vranesic, S. Zaky, N. Manjikian; Computer Organization and Embedded Systems; McGraw Hill, 2012.
- K. Hwang; Computer Arithmetic, Principles, Architecture and Design; John Wiley and Sons; 1979.
- M. Lu; Arithmetic and Logic in Computer Systems; Wiley Interscience, 2004.
- C. Meinel and T. Theobald, Algorithms and Data Structures in VLSI Design: OBDD - Foundations and Applications, Springer, 1998.
- S. M. Mueller and W.J. Paul, Computer Architecture: Complexity and Correctness, Springer Verlag, 2000.
- Walter Oberschelp und Gottfried Vossen: Rechneraufbau und Rechnerstrukturen, Oldenbourg, 2006.
- B. Parhami, Computer Arithmetic - Algorithms and Hardware Designs, Oxford University Press, 2000.
- D.A. Patterson, J.L. Hennessy, Computer Organization Design - The Hardware Software Interface, Morgan Kaufmann Publishers, 2014.
- Gerhard H. Schildt, Daniela Kahn, Christopher Kruegel, Christian Moerz: Einführung in die Technische Informatik, Springer, 2005.

Requirements for attendance of the module (informal)

None

Requirements for attendance of the module (formal)

None

References to Module / Module Number [INF-82-58-M-2]

Course of Study	Section	Choice/Obligation
[INF-31.79-SG] B.Ed. LaGR Computer Science	[Compulsory Modules] Further modules	[P] Compulsory
[INF-66.79-SG] M.Ed. LaBBS Computer Science	[Compulsory Modules] Master's study program	[P] Compulsory
[INF-B5.79-SG] ZEP LaBBS Computer Science	[Compulsory Modules] Certificate course of studies	[P] Compulsory
[INF-B2.?-SG] ZEP LaRSP Computer Science	[Compulsory Modules] Certificate course of studies	[P] Compulsory