

Ehrig, Hartmut; Mahr, Bernd; Cornelius, Felix; Große-Rhode, Martin; Zeitz, Philip
Mathematically structural foundations of computer science. (Mathematisch-strukturelle Grundlagen der Informatik.) (German) [Zbl 0916.68125](#)
Berlin: Springer. xix, 534 S. (1999).

This German textbook provides a comprehensive introduction to those parts of mathematics and logic that are necessary for computer science students. Almost no prerequisites are necessary to understand the book. All chapters are written in a nice and motivating style, using many examples and exercises. The content is formulated in a very precise way. At least major parts of the book are very useful as a source for courses on the matter and also as additional literature for interested students.

The book is divided into five chapters: mathematical terminology, algebraic structures, propositional logic, predicative logic and foundations of category theory.

The chapter on mathematical terminology introduces the basic definitions and results on sets and strings, relations, mappings and their composition, orders and equivalence relations. Algebraic structures include data structures such as numbers and strings but also stacks, queues and further data structures, signatures and algebras, homomorphisms, terms and the concept of structural induction, term algebras and algebraic specifications together with their initial semantics. Propositional logic considers formulas, implications and equivalence, normal forms, Hilbert calculi, sequent calculi and the resolution algorithm. In the chapter on predicative logic, formulas, implication and equivalence, substitution rules and a correct and complete Hilbert calculus are presented. Finally, presented topics from category theory are isomorphism, mono- and epimorphisms, functors and natural transformations, products and co-products, universal constructions, adjoints and applications of category theory in algebra and logic.

Reviewer: [J.Desel \(Karlsruhe\)](#)

MSC:

- [68R99](#) Discrete mathematics in relation to computer science
- [68-01](#) Introductory exposition (textbooks, tutorial papers, etc.) pertaining to computer science
- [03B05](#) Classical propositional logic

Cited in **1** Review

Keywords:

[algebraic structures](#); [data structures](#); [structural induction](#); [term algebras](#); [algebraic specifications](#); [Hilbert calculus](#)