

Booklist for Computer Science Amateurs

A reasoned booklist for computer science amateurs and beginners.

Total: 96 books.

Class

EX: Classic books which are comprehensive and well-organized.

A: Great and in-depth books in some specific fields.

B: Worth-reading.

C: Plain books or abstruse books which may be useful for some experts.

D: Partly useful.

E: General and substitutable.

"+" and "++" means it's potentially helpful in some particular area.

Algorithms and data structures

Algorithms denotes Sequential and parallel computational procedures for solving a wide range of problems. A data structure is the organization and manipulation of data.

Algorithms 4th Edition , Class: A, primer

Concrete Mathematics 2nd Edition , Class: A+, primer

Introduction to Algorithms , Class: D

The Art of Computer Programming , Class: A++

Artificial intelligence

Generic Artificial intelligence

The implementation and study of systems that exhibit an autonomous intelligence or behavior of their own.

Artificial Intelligence - A Modern Approach 3rd Edition , Class: A, primer

Paradigms of Artificial Intelligence Programming - Case Studies in Common LISP , Class: B+* , primer

Automated reasoning

Solving engines, such as used in Prolog, which produce steps to a result given a query on a fact and rule database, and automated theorem provers that aim to prove mathematical theorems with some assistance from a programmer.

Automated Theorem Proof

Automated Theorem Proving , Class: D

Certified Programming with Dependent Types , Class: A

Interactive Theorem Proving and Program Development Coq'Art: The Calculus of Inductive Constructions ,
Class: A++, primer

Little Engines of Proof , Class: D

Mathematical Components , Class: A

Proof Trick Small Inversions , Class: D

Software Foundations , Class: EX, primer

- Volume 1 Logical Foundations
- Volume 2 Programming Language Foundations
- Volume 3 Verified Functional Algorithms
- Volume 4 QuickChick

Computer vision

Algorithms for identifying three-dimensional objects from a two-dimensional picture.

Soft computing

the use of inexact solutions for otherwise extremely difficult problems:

Foundations of Data Science , Class: A, primer

Machine learning

Automated creation of a set of rules and axioms based on input.

Machine Learning A Probabilistic Perspective , Class: B+

Pattern Recognition and Machine Learning , Class: A

The Elemtes of Statistical Learning , Class: B+

Reinforcement Learning, An Introduction , Class: B+, primer

Evolutionary computing

Biologically inspired algorithms.

Artificial Intelligence - Neural Networks Algorithms, Applications, And Programming Techniques , Class: C

Natural language processing

Building systems and algorithms that analyze, understand, and generate natural (human) languages.

Prolog and Natural Language Analysis , Class: B

Robotics

Algorithms for controlling the behaviour of robots.

Expert Systems

Intelligent Systems for Engineers and Scientists 2nd Edition - Adrian A. Hopgood , Class: C

The Handbook of Applied Expert Systems - Jay Liebowitz , Class: C

Communication and security

Networking

Algorithms and protocols for reliably communicating data across different shared or dedicated media, often including error correction.

Computer security

Practical aspects of securing computer systems and computer networks.

Cryptography

Applies results from complexity, probability, algebra and number theory to invent and break codes, and analyze the security of cryptographic protocols.

Computer architecture

Computer architecture

The design, organization, optimization and verification of a computer system, mostly about CPUs and Memory subsystem (and the bus connecting them).

Operating systems

Systems for managing computer programs and providing the basis of a usable system.

Computer Systems A Programmers Perspective 3rd Global Edition , Class: EX, primer

Modern Operating Systems 4th Edition , Class: B++, primer

Operating System Concepts 7th Edition , Class: B, primer

Understanding The Linux Kernel , Class: D+

Concurrent, parallel, and distributed systems

Parallel computing

The theory and practice of simultaneous computation; data safety in any multitasking or multithreaded environment.

Concurrency (computer science)

Computing using multiple concurrent threads of execution, devising algorithms for solving problems on multiple processors to achieve maximal speed-up compared to sequential execution.

Distributed computing

Computing using multiple computing devices over a network to accomplish a common objective or task and thereby reducing the latency involved in single processor contributions for any tasks.

Mathematical foundations

Introduction to Linear Algebra , Class: C+, primer

Mathematics for Computer Science 2013 , Class: B++

Probability theory and examples 4th Edition , Class: C, primer

Foundations of Computer Science, C Edition , Class: EX, primer

Coding theory

Useful in networking and other areas where computers communicate with each other.

Game theory

Useful in artificial intelligence and cybernetics.

Graph theory

Foundations for data structures and searching algorithms.

General Topology, John L. Kelley , Class: C, primer

Mathematical logic

Boolean logic and other ways of modeling logical queries; the uses and limitations of formal proof methods

A Course In Mathematical Logic , Class: A+, primer

Discrete Mathematics and Its Applications , Class: B+, primer

Logic in Computer Science, Modelling and Reasoning about Systems , Class: EX, primer

Logic for Applications 2nd Ed , Class: A, primer

Mathematical Logic, Ebbinghaus , Class: C, primer

Algebraic Logic

Boolean Functions Theory, Algorithms, and Applications , Class: C+

Category Theory

*Category Theory A Gentle Introduction, Class: A+, primer

Categories for the Working Mathematician, Saunders Mac Lane , Class: A++

Basic Category Theory for Computer Scientists , Class: C, primer

Formal Systems

Theory of Formal Systems , Class: C

Lattice Theory

Introduction to Lattices and Order , Class: E, primer

Lambda-calculus

Lambda-Calculus and Combinators, an Introduction , Class: A

Programming Languages and Lambda Calculus , Class: C+

The Lambda Calculus, It's syntax and Semantics , Class: A+

Modal Theory

Pi-calculus

An Introduction to the pi-Calculus , Class: C, primer

Handbook of Process Algebra , Class: D

Introduction to Process Algebra , Class: B++, primer

*The Pi-Calculus A Theory of Mobile Processes, Class: B+

Proof Theory

Proof Theory, Gaisi Takeuti, 2nd Ed , Class: B

Structural Proof Theory , Class: B+

Recursion Theory

Recursion Theory for Metamathematics, Raymond M. Smullyan , Class: B

COMPUTABILITY An introduction to recursive function theory , Class: D, primer

Set Theory

Introduction to Axiomatic set theory, Takeuti G. Zaring W. , Class: B, primer

Number theory

Theory of the integers. Used in cryptography as well as a test domain in artificial intelligence.

Programming languages and compilers

Lectures on the Curry-Howard isomorphism-Elsevier Science , Class: A, primer

Compiler theory

Theory of compiler design, based on Automata theory.

Compilers, Principles, Techniques, and Tools, 2nd Edition , Class: C

Compiling With Continuations , Class: D+

Language Implementation Patterns , Class: B++, primer

Programming language pragmatics

Taxonomy of programming languages, their strength and weaknesses. Various programming paradigms, such as object-oriented programming.

Concepts, Techniques and Models of Computer Programming , Class: EX

Essentials of Programming Languages , Class: B+, primer

Let Over Lambda , Class: A+

LISP In Small Pieces , Class: B++

Parsing techniques - a practical guide , Class: B

Programming language theory

Concepts Of Programming Languages, 11th Ed , Class: EX, primer

Foundations for Programming Languages, John.C..Mitchell , Class: EX, primer

Practical Foundations for Programming Languages 2nd Edition , Class: c

Programming Languages Application and Interpretation , Class: D

Structure and Interpretation of Computer Programs , Class: B, primer

The Art of the Metaobject Protocol , Class: E

Formal semantics

rigorous mathematical study of the meaning of programs.

Concrete Semantics , Class: A

Type theory

Formal analysis of the types of data, and the use of these types to understand properties of programs — especially program safety.

Homotopy Type Theory , Class: A

Type Theory and Functional Programming , Class: A+

Types and Programming Languages , Class: A++

Software engineering

Computer programming

The practice of using a programming language to implement algorithms.

A Little Java, A Few Patterns , Class: C

An Introduction To Programming In Emacs Lisp, 2nd Edition , Class: D, primer

Automate the Boring Stuff with Python , Class: E++, primer

Hacker's Delight 2nd Edition , Class: A

How To Design Programs , Class: A+, primer

On Lisp , Class: C

Practical Common Lisp , Class: C, primer

Programming in IDRIS , A Tutorial* , Class: A+, primer

Programming Elixir 1.3 , Class: B, primer

Real World OCaml , Class: C, primer

Real World Haskell , Class: C

Rust Essentials , Class: B, primer

The Art of Prolog 2nd Edition , Class: D

The Little Schemer 4th Edition , Class: C+, primer

The Reasoned Schemer , Class: C

The Scheme Programming Language 4th Edition , Class: E

The Seasoned Schemer , Class: C, primerp

Formal methods

Mathematical approaches for describing and reasoning about software design.

Formal Reasoning About Programs , Class B+

Program Analysis and Verification

Principle of Model Checking , Class: A

Principles of Program Analysis , Class: A, primer

Theory of computation

Introduction to Languages and The Theory of Computation 4th Edition , Class: C

Automata theory

Different logical structures for solving problems.

An Introduction to Formal Languages and Automata 3rd Edition , Class: B+

Introduction To Automata Theory Languages, and Computation , Class: D, primer

Computability theory

What is calculable with the current models of computers. Proofs developed by Alan Turing and others provide insight into the possibilities of what may be computed and what may not.

Computational complexity theory

Fundamental bounds (especially time and storage space) on classes of computations.

Quantum computing theory

Explores computational models involving quantum superposition of bits.

Quantum Computation and Quantum Information , Class: C++, primer