

518. Computer Science

Discrete Mathematics: Sets, functions, relations, counting; generating functions, recurrence relations and their solutions;

Automata Theory: Regular expressions, non deterministic and deterministic finite automata, subset construction, regular languages, non regularity (pumping lemma), context free grammars, basic ideas about computable and non-computable functions.

Programming, Data Structures and Algorithms: Data types, control structures, functions/ modules, object-oriented programming concepts: sub-typing, inheritance, classes and subclasses, etc. Basic data structures like stacks, linked list, queues, trees, binary search tree, heaps; sorting, searching (bubble sort, quick sort, merge sort, heap sort), Graphs algorithms: Basic definitions, breadth _first search, depth _first search, minimum spanning trees, shortest paths. Algorithmic complexity, growth of functions/ recurrence relations, and asymptotic notations, time complexity of algorithms. Algorithmic techniques: Dynamic programming, divide and conquer and greedy algorithms.

Computer Organization: Boolean logic, truth tables, Boolean circuits | and, or, not, and, nand gates. flip-flops, design of combinational and sequential circuits, instruction formats, addressing modes, types of memory and their organization, interrupts and exceptions.

Operating Systems: Basic functionalities, multiprogramming, multiprocessing, multithreading, timesharing, real-time operating system; processor management, process synchronization, memory management, device management, file management, security and protection; case study: Linux.

Software Engineering: Software process models, requirement analysis, software specification, software testing, software project management techniques, quality assurance.

DBMS and File Structures: File organization techniques, database approach, data models, DBMS architecture, data independence, E-R model, relational data models, SQL, normalization and functional dependencies.

Computer Networks: ISO-OSI and TCP/IP models, basic concepts like transmission media, signal encoding, modulation techniques, multiplexing, error detection and correction; overview of LAN/ MAN/ WAN; data link, MAC, network, transport and application layer protocol features; network security.