

Ph.D. Preliminary Examination Topics & Reading List Kent State University

1. Data Structures

- C++ and object oriented programming
- Abstract data types
- Fundamental data structures including:
 - stacks, queues, lists, binary trees, trees, graphs
 - vectors, maps, sets, containers and iterators
- Dynamic data structures: dynamic arrays, linked lists
- Expression notations: prefix, postfix, infix
- Binary tree traversals: preorder, postorder, inorder
- Hashing, 2-3-4 trees, red-black trees
- Recursion

Suggested reading: Ford & Topp, *Data Structures with C++*, Prentice Hall, 2nd Edition.
Chapters: 1-12

2. Operating Systems

- Process management: processes, threads, CPU scheduling, Process synchronization
- Memory management: main memory, virtual memory.
- Storage management: file system interface and implementation, disk structure, OS I/O systems

Suggested reading: Silberschatz, Galvin, & Gagne, *Operating Systems Concepts*, 8th edition.
Chapters: 1-6, 8-13.

3. Design and Analysis of Algorithms

- Basic analysis tools: growth functions and asymptotic analysis
- Algorithm design strategies: greedy, divide and conquer, dynamic programming
- Analysis & design: hashing, basic searching & sorting, elementary graph algorithms

Suggested reading: Cormen, Leiserson, Rivest & Stein, *Introduction to Algorithms*, 2nd edition.
Chapters: 2-4, 6-8, 11-16, 22-25 (excluding sections 4.4, 11.5, 12.4, 16.4, 16.5, 24.4, 24.5, 25.3).