

School of Mathematics

MA3467 — Algorithms

2011-12

(JS & SS Mathematics
SS TSM Mathematics)

Lecturer: Dr. C. Ó Dúnlain

Requirements/prerequisites:

Duration: 11 weeks

Number of lectures per week: 3 including tutorials

Assessment: 10% coursework and 90% exam.

ECTS credits: 5

End-of-year Examination: This module will be examined jointly with MA3468 in a 3-hour examination in Trinity term, except that those taking just one of the two modules will have a 2 hour examination. However there will be separate results for MA3467 and MA3468.

Description:

- Sorting: merge, quick, radix, heaps and heapsort
- Lookup as a recurrent theme; sequential, lists.
- Searching: binary search trees; average cost of insertion;
- Michaela Heyer's scheme for randomising deletions (if time permits)
- Red-black trees: find, insert, delete, join, split
- Splay trees: ditto
- Union-find schemes.
- Union-split-find: van Emde Boas et al.
- Davenport-Schinzel sequences (if time permits)
- Knuth-Morris-Pratt string matching
- Boyer-Moore string matching
- Hashing (mostly concerned with rehashing strategies). Chaining, uniform (and double), linear rehashing.
- Rabin-Karp (string search through fingerprinting?) (if time permits)
- Bloom filters

- Directed graphs: acyclicity and topological sort; dfs and ditto; strong components.
- Floyd-Warshall all-pairs shortest path algorithm. Dijkstra. (if time permits)
- Network flows: Edmonds and Karp. (if time permits)

August 8, 2011