School of Mathematics

Module MA3467 — Algorithms 2009-10
(JS & SS Mathematics, JS & SS Two-subject Moderatorship)

Lecturer: Dr. Colm Ó Dúnlaing

Requirements/prerequisites:

Duration: Michaelmas term, 11 weeks

Number of lectures per week: 3 lectures including tutorials per week

Assessment: Coursework and final exam. The coursework will be agreed by consultation before the course begins or in the first week.

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.

Description:
    (Preliminary draft.)
    We begin with binary search trees, with average-case analysis, including recent work on node deletion. Heaps and heapsort. Mergesort. $\Omega(n \log n)$ lower bound. Red-black search trees for lookup, add, remove, join, and split. Splay trees. Hash tables.
    Union-find and union-split-find.
    Knuth-Morris-Pratt pattern matching. Extension to Tries, boolean combinations of matches. Algebra of strings and the Boyer-Moore algorithm.
    Graph connectivity, acyclicity, biconnectivity, strong connectivity, the Floyd-Warshall algorithm and irreducible matrices.
    The Jordan Curve Theorem — a digression.
    Planar graphs. The Hopcroft-Tarjan planarity algorithm. A constructive version of Kuratowski's Theorem. Triangulating planar graphs. Barycentric embeddings.

May 8, 2009