

School of Mathematics

Course 2BA1 — Mathematics for SF Computer Scientists
(SF Computer Science and CS Linguistics & a Language)

2003-2004

Lecturer: Dr. D. R. Wilkins

Requirements/prerequisites: 1BA1 — A course in calculus and linear algebra.

Duration: 24 weeks

Number of lectures per week: 3

Assessment: Assignments counting 10%

End-of-year Examination: One three hour examination

Description:

1. The Principle of Mathematical Induction.
2. Sets and functions: power sets; binary relations; congruences; equivalence relations; partial orders and lattices; Cartesian products; functions between sets; inverse functions; injective, surjective and bijective functions; partial mappings.
3. Graphs: incidence and adjacency matrices; complete graphs; bipartite graphs; connectedness and components; Euler trails; Hamilton paths; forests and trees; directed graphs.
4. Algebraic structures: semigroups, monoids and groups; homomorphisms and isomorphisms; quaternions and rotations.
5. Formal languages and grammars: formal languages; context-free grammars; specifications in Backus-Naur form; regular grammars; finite state acceptors.
6. Ordinary Differential Equations: second order differential equations, initial and boundary value problems.
7. Fourier Series: Fourier series; sine series; cosine series.

The web site for this course is located at <http://www.maths.tcd.ie/~dwilkins/Courses/2BA1/>. It contains lecture notes (in PDF format) and assignments from the current year and from previous years.

Textbooks:

- M. Piff, *Discrete Mathematics*, Cambridge University Press.

June 25, 2004