

School of Mathematics

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

2000-2001

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.
5. Grammars: phrase structure and Chomsky hierarchy; Languages: context free and regular; Machines: finite state acceptors
6. Ordinary Differential Equations: higher order, initial and boundary value problems
7. Fourier Series: orthonormal functions, Euler coefficients, half-range expansions, truncated series approximation.

Textbooks:

1. M. Piff, *Discrete Mathematics*, Cambridge University Press.
2. Judith L. Gersting, *Mathematical Structures for Computer Science*, W. H. Freeman.
3. D. J. Cooke & H. E. Bez, *Computer Mathematics*, Cambridge University Press.
4. R. P. Grimaldi, *Discrete and Combinatorial Mathematics*, Addison-Wesley.
5. W. E. Boyce & R. C. DiPrima, *Elementary Differential Equations*, John Wiley.