

QUEEN MARY AND WESTFIELD COLLEGE

MAS 417

Association Schemes and Partially Balanced Designs

Reading List

Spring 2001

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- [1] E. BANNAI & T. ITO: *Algebraic Combinatorics. I. Association Schemes*, Benjamin, Menlo Park, California, 1984.
 - [2] N. L. BIGGS: *Algebraic Graph Theory, Cambridge Tracts in Mathematics*, 67, Cambridge University Press, Cambridge, 1974.
 - [3] A. E. BROUWER, A. M. COHEN AND A. NEUMAIER: *Distance-Regular Graphs*, Springer-Verlag, Berlin, 1989.
 - [4] P. J. CAMERON & J. H. VAN LINT: *Designs, Graphs, Codes and their Links, London Mathematical Society Student Texts*, 22, Cambridge University Press, Cambridge, 1991.
 - [5] W. H. CLATWORTHY: *Tables of Two-Associate Class Partially Balanced Designs, Applied Mathematics Series*, 63, National Bureau of Standards, Washington DC, 1973.
 - [6] P. DEMBOWSKI: *Finite Geometries*, Springer-Verlag, Berlin, 1968.
 - [7] J. A. JOHN: *Cyclic Designs*, Chapman and Hall, London, 1987.
 - [8] P. W. M. JOHN: *Statistical Design and Analysis of Experiments*, MacMillan, New York, 1971.
 - [9] J. H. VAN LINT & R. M. WILSON: *A Course in Combinatorics*, Cambridge University Press, Cambridge, 1992.
 - [10] F. J. MACWILLIAMS & N. J. A. SLOANE: *The Theory of Error-Correcting Codes*, North Holland, Amsterdam, 1977.
 - [11] A. POTT: *Finite Geometry and Character Theory, Lecture Notes in Mathematics*, 1601, Springer-Verlag, Berlin, 1995.
 - [12] D. RAGHAVARAO: *Constructions and Combinatorial Problems in Design of Experiments*, Wiley, New York, 1971. (I think that there is a Dover reprint available.)
 - [13] M. S. SHRIKHANDE & S. S. SANE: *Quasi-Symmetric Designs, London Mathematical Society Lecture Note Series*, 164, Cambridge University Press, Cambridge, 1991.
 - [14] A. PENFOLD STREET & D. J. STREET: *Combinatorics of Experimental Design*, Oxford University Press, Oxford, 1987.

Notes

Association schemes See [4], Chapter 17; [10], Chapter 21; or [9], Chapter 30. Section 7.1 of [6] is a lightning tour of what was known about association schemes and partially balanced designs before strongly regular graphs were introduced.

A very complete reference is [1], but this concentrates on very different aspects of the subject from what I shall cover.

Strongly regular graphs are discussed in Chapter 2 of [4] and in Chapter 21 of [9], which also discusses some particular partially balanced incomplete block designs, including lattice designs, which it calls *nets*. Strongly regular graphs can also be found in Chapter 2 of [13], whose succeeding chapters not only take the theory of strongly regular graphs beyond what I shall cover but also refer to partially balanced designs.

Distance-transitive graphs are discussed in [2], and, in more detail than you are likely to want to know, in [3].

Partially balanced incomplete-block designs These are discussed, mostly for only two associate classes, in Chapters 12, 14 and 15 of [8], Chapter 8 of [12] and Chapter 11 of [14]. The book [5] contains much more than just tables.

Cyclic things [7] gives a non-algebraic perspective on incomplete-block designs which are partially balanced with respect to some cyclic association scheme. At the other extreme, [11] gives a thoroughly algebraic treatment of cyclic association schemes that are either trivial or group divisible.

Related topics You may need to learn, or revise, related ideas in graph theory, balanced incomplete-block designs, Latin squares, linear algebra, random variables. You can do this by dipping into [4], [8], [9], [12] or [14].

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