

# Outline

1. Counting
  - (a) Permutations and Combinations
  - (b) Binomial Coefficients
  - (c) Inclusion-Exclusion
  - (d) Generating Functions
2. Graphs
  - (a) Trees
  - (b) Matchings and Systems of Distinct Representatives
  - (c) Connectivity
  - (d) Chromatic number, Clique Number and Independence Number.
  - (e) Planar Graphs
3. Designs
  - (a) Steiner Triple Systems and block designs.
  - (b) Orthogonal Latin Squares, Transversal Designs and Orthogonal Arrays
  - (c) Projective Planes
  - (d) Pairwise Balanced Designs

## References:

R.A. Brualdi, *Introductory Combinatorics*, Prentice Hall, 1999.

H.J. Ryser, *Combinatorial Mathematics*, Mathematical Association of America, Carus Mathematical Monograph, Number 14, 1963.

D.B. West, *Introduction to Graph Theory*, Prentice Hall, 2000.

A. Tucker, *Applied Combinatorics*, John Wiley & Sons, Inc.