

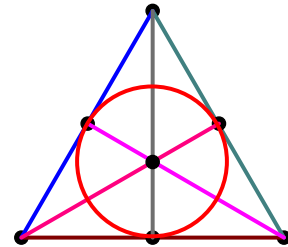
Ma 764: Topics in Algebra Finite Geometry

- Time and Place:** MWF 9:00 – 9:50 am in CB 343
- Instructor:** Heide G. Luerksen
- Office:** 751 POT
- Email:** heide.gl@uky.edu
- Office hours:** Just consult me by email or stop by my office if the door is open.
- Grading:** Will be based on participation in class (including some occasional small presentations).
- Prerequisites:** Linear Algebra (MA 565) and Algebra I and II (MA 561, MA 661).

Some Topics (not complete):

After discussing the basic concepts on incidence structures we focus on the following topics.

- Non-isomorphic projective planes of order 9 and other classification results.
- Spreads and induced translation planes
- Latin squares
- Theorems of Pappus and Desargues
- Theorem of Bruck-Ryser
- Relation to classical coding theory (MDS codes)
- Relation to rank-metric codes and subspace codes
- Quasifields, their relation to translation planes, and applications to maximum-rank-distance codes



Some Literature (not complete):

- E. Moorhouse: Incidence Geometry;
http://math.ucr.edu/home/baez/qg-fall2016/incidence_geometry.pdf
- J. Bierbrauer: Finite Geometries;
www.math.mtu.edu/~jbierbra/HOMEZEUGS/finitegeom04.ps
- P. Dembowski: Finite Geometries; Springer, 1968
- P. Cameron: Combinatorics: Topics, Techniques, Algorithms; Cambridge University Press, 1994
- S. Ball and Z. Weiner: An Introduction to Finite Geometry;
<https://mat-web.upc.edu/people/simeon.michael.ball/IFG.pdf>
- J. De La Cruz et al: Algebraic Structure of MRD Codes; Advances in Mathematics of Communications (2016), vol. 10, 499–510
- J. Sheekey: A new family of linear maximum rank distance codes; Advances in Mathematics of Communications (2016), vol. 10, 475–488