

Discrete Mathematics Seminar

Time: Friday, 7 October 2011, 12:30–1:30 PM

Location: 238 Derrick Hall

Title: Splitting the atom: on edge-colorings of complete graphs

Speaker: Dr. Jacob Manske, Mathematics Department

Abstract:

Let K_N denote the complete graph on N vertices with vertex set $V = V(K_N)$ and edge set $E = E(K_N)$. For $x, y \in V$, let xy denote the edge between the two vertices x and y . Let L be any finite set and $\mathcal{M} \subseteq L^3$. Let $c : E \rightarrow L$. Let $[n]$ denote the integer set $\{1, 2, \dots, n\}$.

For $x, y, z \in V$, let $c(xyz)$ denote the ordered triple $(c(xy), c(yz), c(xz))$. We say that c is *good with respect to* \mathcal{M} if the following conditions obtain:

- (1) $\forall x, y \in V$ and $\forall (c(xy), j, k) \in \mathcal{M}$, $\exists z \in V$ such that $c(xyz) = (c(xy), j, k)$;
- (2) $\forall x, y, z \in V$, $c(xyz) \in \mathcal{M}$; and
- (3) $\forall x \in V \forall \ell \in L \exists y \in V$ such that $c(xy) = \ell$.

We investigate particular subsets $\mathcal{M} \subseteq L^3$ and those edge colorings of K_N which are good with respect to these subsets \mathcal{M} . We also remark on the connections of these subsets and colorings to projective planes, Ramsey theory, and representations of relation algebras.