DAVID PIKE, Memorial University of Newfoundland
Equitably Coloured BIBDs

A balanced incomplete block design (BIBD) with parameters v, k and λ consists of a v-set V of points together with a set $\mathcal{B}$ of k-subsets of V called blocks, such that each 2-subset of V is a subset of exactly λ blocks of $\mathcal{B}$. A colouring of a design $(V, \mathcal{B})$ is a function $f : V \rightarrow C$, where $C = \{c_1, \ldots, c_\ell\}$ is a set of elements called colours. A weak colouring of a design is a colouring f such that $|\{f(x) : x \in B\}| > 1$ for each $B \in \mathcal{B}$ (i.e., each block has at least two colours). An equitable colouring is a colouring such that for each block $B \in \mathcal{B}$ the number of points of any colour $c_i \in C$ is within 1 of the number of points of any other colour $c_j \in C$ (i.e., $-1 \leq |B \cap C_i| - |B \cap C_j| \leq 1$, where $C_t = \{x \in V : f(x) = c_t\}$ denotes those points of V having colour c_t). We determine necessary and sufficient conditions for equitably colourable BIBDs. This is joint work with Robert Luther.