Given a graph $G$ and $I$, the family of independent sets of vertices in $G$, we say a function $f : I \to [0, \infty)$ is a fractional coloring if for each vertex $v$, $1 \leq \sum_{I \in I} f(I)$ the inequality holds. Further, the weight of $f$, denoted $w(f)$, is defined to be $\sum_{I \in \mathcal{I}} f(I)$. The fractional chromatic number, $\chi_f(G)$, is the minimum weight of all fractional colorings. This extends the notion of chromatic number as when $f$ is restricted to integer values, this is the traditional chromatic number. We develop methods for producing bounds on $\chi_f(G)$. In doing so, we show simple proofs for theorems similar to Grotzch’s Theorem for 3-colorability and the five color theorem for planar graphs. 

(Photos credit: Allison Blanchard).

For the DM seminar schedule, see:
https://www.people.vcu.edu/~nobushaw/dms.html