

# VCU Discrete Mathematics Seminar

## *Recolourable Graphs*

**Prof Kathie Cameron**  
**(Wilfred Laurier University, Canada)**

Wednesday, April 24

1:00-1:50 EDT

**In person!** in 4145 Harris Hall, and Zoom @

<https://vcu.zoom.us/j/92975799914>  
password=graphs2357



A  $k$ -colouring of a graph  $G$  is a function from the vertex-set of  $G$  to a set of  $k$  colours so that the ends of each edge of  $G$  are assigned different colours. We consider the question: When it is possible to obtain any  $k$ -colouring from any other by changing the colour of one vertex at a time, while always having a  $k$ -colouring? This question is equivalent to asking whether the “reconfiguration graph” is connected: The reconfiguration graph of the  $k$ -colourings, denoted  $R_k(G)$ , is the graph whose vertices are the  $k$ -colourings of  $G$ , and two colourings are adjacent in  $R_k(G)$  if they differ in colour on exactly one vertex.

We call a graph recolourable if  $R_k(G)$  is connected for every  $k$  bigger than the chromatic number of  $G$ . We have characterized the graphs  $H$  such that all graphs  $G$  which don’t have  $H$  as an induced subgraph are recolourable. We have done the same when two 4- vertex graphs are excluded as induced subgraphs (except for one pair) and for some other hereditary classes of graphs including several subclasses of  $P_5$ -free graphs. We also explore graph decompositions applied to recolouring including modular decomposition and “tight clique cutsets”.

This is joint work with Manoj Belavadi, Owen Merkel and Ni Luh Dewi Sintari.

For the DM seminar schedule, see:

<https://go.vcu.edu/discrete>