

# VCU Discrete Mathematics Seminar

## *Nowhere-zero 3-Flows in Graphs and Signed Graphs*

**Prof C. Q. Zhang**  
**West Virginia University**

Tuesday, March 24

12:30–1:20

4145 Harris Hall

Tutte conjectured that *every 4-edge-connected graph admits a nowhere-zero 3-flow*. In this talk, we present two recent results about integer flows for graphs and signed graphs.

Tutte observed that every nowhere-zero  $k$ -flow on a plane graph gives rise to a  $k$ -vertex-coloring of its dual, and vice versa. Thus nowhere-zero integer flow and graph coloring can be viewed as dual concepts. Jaeger further shows that if a graph  $G$  has a face- $k$ -colorable 2-cell embedding in some *orientable* surface, then it has a nowhere-zero  $k$ -flow. However, if the surface is *non-orientable*, then a face- $k$ -coloring corresponds to a nowhere-zero  $k$ -flow in a *signed graph* arising from  $G$ . Graphs embedded in orientable surfaces are therefore a special case that the corresponding signs are all positive.

We will discuss two recent results which extend a recent breakthrough by Carsten Thomassen. (Joint work with Y.Z. Wu, D. Ye and W. Zang.)

