

Anyone who has worked with matroids has come away with the conviction that matroids are one of the richest and most useful ideas of our day.

—Gian-Carlo Rota, *Indiscrete Thoughts*.



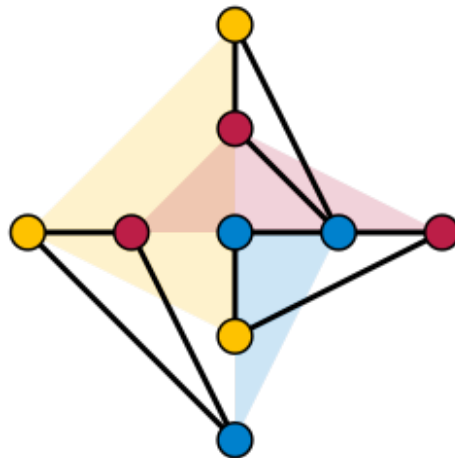
Matroid Theory: The Value of Abstraction

Topics in Applied Science 490/791 — Spring 2017
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Do you see linear (in)dependence all around you?



Notions of independence arise in various contexts, yet are often not tied together. These similarities are the heart of **matroids**, an abstraction of matrices and graphs and several other combinatorial objects. This course will provide an accessible introduction for students interested in matroids.



Only a cursory knowledge of linear algebra and graph theory will be assumed, so come join us! Learn how matroid theory unifies the concepts of vector spaces and graphs. Delving deeper, matroids shed light on arrangements of hyperplanes, configurations of points, polytopes, and geometric lattices. Matroids have found many applications in discrete mathematics, computer science, operations research, theoretical chemistry, and neuroscience.

Our primary text will be “Matroids: A Geometric Introduction” by Gary Gordon and Jennifer McNulty, Cambridge University Press, 2012.

The application of matroids to mathematical biology will be highlighted, e.g., Markov chain models of ion channel gating and receptor pharmacology.