

# The Oliver Club

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## **Caroline Klivans**, University of Chicago and Cornell University ***Spanning Trees and Generalized Matrix-Tree Theorems***

*The classical Matrix-Tree Theorem, first observed by Kirchoff in his work on electrical networks, expresses the number of spanning trees of a graph. It is a fundamental theorem in combinatorics with a wide range of applications including economics, theoretical computer science and machine learning.*

*This talk concerns generalizations of the Matrix-Tree Theorem from graphs to more general cell complexes of arbitrary dimension. Central to this investigation is the study of a combinatorial Laplacian which is a discrete version of the usual Laplace operator on differential forms on a Riemannian manifold. I will give a brief history of the combinatorial Laplacian and more recent considerations from topological combinatorics. In particular, we present cellular Matrix-Tree Theorems which enumerate cellular spanning trees in terms of the spectra and determinant of a combinatorial Laplacian.*

*This talk reflects joint work  
with Art Duval and  
Jeremy Martin.*



Thursday, September 17, 2009  
at 4:25 PM in 406 Malott Hall

Refreshments will be served at 3:55 PM in the Mathematics Department lounge (532 Malott Hall).