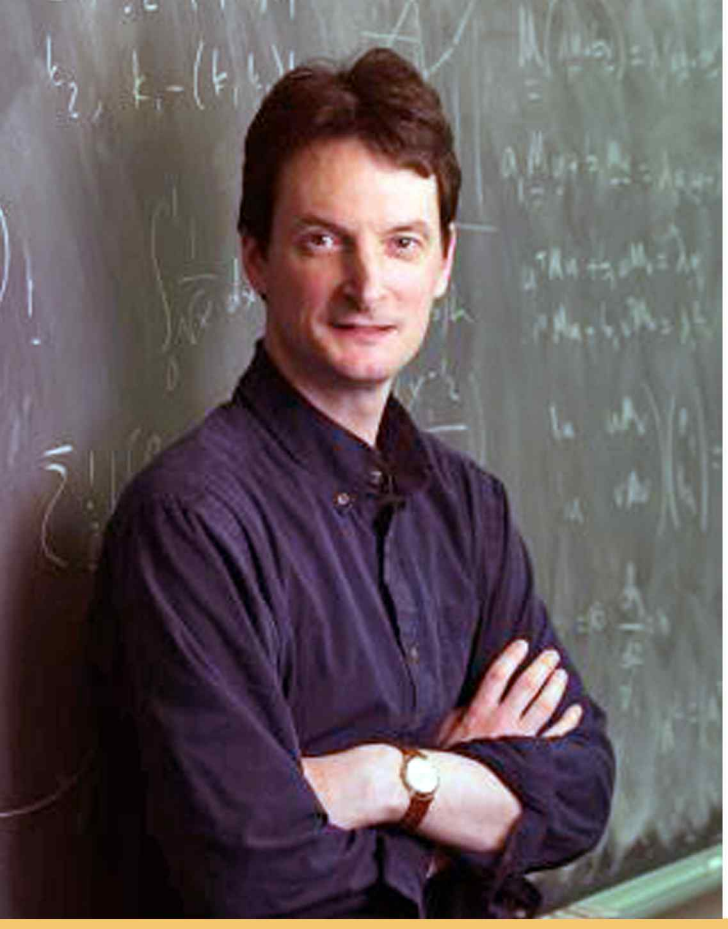

The Department of Mathematics, University at Buffalo, presents the Thirtieth Anniversary

MYHILL LECTURE SERIES

OCTOBER 24, 25 & 26, 2018

Mark Newman

Anatol Rapoport Distinguished University Professor of Physics, Department of Physics
Center for the Study of Complex Systems, University of Michigan

The John R. Myhill Lecture Series is sponsored in part by the Darwin D. Martin Endowment.

Wednesday, October 24, 5:00 p.m.
Knox Hall 110, North Campus

Epidemics, Erdos numbers and the Internet: The mathematics of networks

There are networks in every part of our lives: the Internet, the power grid, the road network, networks of friendship or acquaintance, ecological networks, biochemical networks, and many others. As large-scale data on these networks have become available in the last few years, a new science of networks has grown up combining empirical observations with the mathematics of graph theory to shed light on systems ranging from bacteria to the whole of human society. This first lecture will give an introduction to this fascinating branch of science, and discuss some of its central questions and the techniques we use to answer them.

Thursday, October 25, 4:00 p.m.
NSC 222, North Campus

Randomized models of networks

A fundamental class of tools in the study of networks are network models such as the classic random graph of Erdos and Renyi as well as more modern models, including configuration models and preferential attachment models. This lecture will introduce the mathematics behind these models and demonstrate how they are applied to help us understand such things as degree distributions, assortativity, and community structure, as well as processes taking place on networks such as the spread of disease.

Friday, October 26, 4:00 p.m.
NSC 222, North Campus

Phase transitions and belief propagation in sparse networks

Most graphs encountered in the empirical study of networks, including Internet and Web graphs, social networks, and biological and ecological networks, are very sparse. Standard spectral and linear algebra methods fail badly when applied to such graphs and a fundamentally different approach is needed. Message passing methods, such as belief propagation, offer a promising solution. In this lecture I will illustrate how message passing can be used to calculate the structural and dynamic properties of a range of common network models. I will also show how message passing can be applied to real-world data to calculate fundamental properties such as percolation thresholds, graph spectra, and community structure, and how the fixed-point structure of the message passing equations has a deep connection to structural phase transitions in networks.

RELATED EVENTS

- Oct. 24: Reception after Lecture 1 in Math 240.
- Oct. 24, 25 & 26: Coffee at 3:30p.m. in Math 240.

The Myhill Lectures are free and open to the public.
To learn more visit our website, math.buffalo.edu
or give us a call, 716.645.6284.

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