

2014 Fall Theme Semester on Discrete
Networks: Geometry, Dynamics and
Applications

**Epidemics, Erdos numbers, and the
Internet: The form and function of
networks**

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The scientific and mathematical study of networked systems, such as the the Internet, biological and biochemical networks, transportation and distribution networks, social and professional networks, and information networks, focuses on two primary questions: first, what is the structure of the networks we see in the real world, and second, how does that structure affect the behavior of the systems in question? These lectures will demonstrate some of the techniques developed for answering these questions and some of the answers they give us. Among the topics covered will be the quantification of network structure using measures such as degree distributions, correlation coefficients, and community structure; the design of computer algorithms for extracting knowledge from large-scale network data; mathematical models of networks including random graphs and preferential attachment models; and network processes, such as robustness and failure, the spread of information or infection over networks, and the behavior of network processes such as random walks, traffic flow, and percolation.