



College of Science and Mathematics

Department of Mathematics

Discrete Mathematics Seminar

Wednesday, March 1, 2017

3:30—4:30 PM in D-250 (Marietta Campus)

“Network Ecology: Using Math to Understand Ecosystems”



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Living systems are linked through multiple networks of energy, matter, and informational exchanges. Patterns in these exchange networks reveal information about the structure, function, and behavior of these complex systems as well as the processes that create them. Ecological Network Analysis (ENA) is a method to investigate the energy and matter exchange networks in ecological systems. In this presentation I review the formal features of the ENA model, and introduce an organizational skeleton for the multitude of techniques. I then illustrate applications of ENA to investigate ecological problems of both a theoretical and applied nature. To conclude, I will characterize a number of open mathematical and statistical challenges for ENA including: (1) construction of useful null models, (2) benchmarking network metrics, (3) violation of series convergence criteria, and (4) an uncertainty analyses that enables stronger inference. ENA has provided novel insights into food web organization, ecosystem functioning, estuarine biogeochemistry, and the sustainability of urban and industrial systems. With further development, it may be a useful decision tool for ecosystem management and sustainable development.