

CS 491/591
Fall 2012

Network Theory:
Computational Phenomena and Processes

Tuesdays & Thursdays, 3:35 – 4:50 p.m.

Pulliam 34

Dr. Henry Hexmoor

Computer and information networks interconnect communities and institutions with various levels leading to many desirable empowerments for populations as well as many perilous epidemics. Few phenomena such as *the small worlds effects* and *the law of the few* exemplify paradoxes and foundations of networks in the world. We will examine foundational computational models of human and machine proxy networks. Structures of network formation will be discussed. Quantities and qualities of social and economic networks will be our next focus. Reasoning, migration, diffusion, and games over networks will be our second emphasis area. We will then turn to the phenomena over the Internet and search. Dynamic processes such as percolation will be among our last set of topics.

The course goes well beyond game theory but includes the basics of it, such as economic networks and social networks. Examples will be built from news like the Arab Spring, the Occupy movement, and the networked scientific, ad hoc working teams.

The course will offer skills to (a) explain natural and collective phenomena in online networks and cyberspace, and (b) understand and design network policies to produce desirable effects.

Prerequisite: CS 330 with a grade of “C” or better or **approval of instructor**

Textbook: D. Easley, J. Kleinberg, 2010. Networks, Crowds, and Markets, Cambridge University press.

Recommended book: M.O. Jackson, 2008. Social and Economic Networks, Princeton University Press.