

MATH 8410: Boolean Networks

MW 5:30 - 6:45 PM | DSC 255 | Dr. Dora Velcsov

Description: Boolean networks are a class of complex networks in which nodes can take on two values, ON and OFF, and whose evolution from one time step to another is based on logical relationships with other nodes. Examples of Boolean models: a genetic or protein network has nodes that are expressed/regulated or not based on the expression levels of other nodes; in an epidemic network the nodes are individuals that become infected or not based on their exposure to other infected nodes.

Pre-requisites: A fair mathematical maturity: MATH 1960 (Calculus II), MATH 2230 (proof writing skills), MATH 4740 or equivalent (basic probability theory), basic computer skills; or permission of instructor.

Some topics: cellular automata; Boolean network topology and Boolean functions; density of ones; application of chaos theory to characterize stability of networks; mean field approximations; noisy networks; determinative power of nodes; network reduction; synchronization; simulations. The students will be exposed to authentic research projects that could lead to journal publications, MA theses, and MS projects. Course notes will be provided.

Learning environment: This class promotes inquiry-based learning (IBL) by allowing students to study the material on their own or in teams for the most part of the semester. The students are expected to take initiative and required to give presentations. The projects will be presented as part of an in-class student



For More Information:
Dr. Dora | 402.554.3295
dvelcsov@unomaha.edu

