Math Department Seminar

Title: Controllability of Graphs

Speaker: Cesar Aguilar

Time: Wednesday, June 3 at 2:10

Place: Science III Room 213

Abstract: Networks, or graphs, are a useful tool to model complex dynamic behavior in many science and engineering applications. An important problem in dynamic networks is the state transfer problem wherein it is desired to transfer the state of a dynamic network to a pre-selected final state. For practical and economical reasons, it is necessary to select only a small subset of the nodes of the network to act as control agents whose task is to solve the state transfer problem. Using methods from graph theory, it is desirable to characterize in graph-theoretic terms which subsets of the nodes induce controllable networks. For example, it is known that symmetries present in the network can induce uncontrollable networks and it is thus necessary to select the control agents that “break” the symmetries of the network. In this talk, I will review some of the work that is going on in the control systems and graph theory community to understand what other graph structures can induce uncontrollability in networks. I will describe some recent results on using equitable partitions of graphs and their relation to the network controllability problem. I will also present some open problems suitable for undergraduate research.

Students Especially Encouraged to Attend