

## **CSC 84200 Application of game theory and economics in network design and communications**

Professor Shamik Sengupta

Tuesdays, 11:45 – 1:45 pm

Network Design or more generally networking with its many variants are fast emerging as dynamic field of research. The visionary demands for ubiquitous access to information (anytime, anywhere) with "untethered" communication have introduced new challenges and new constraints in this emerging area.

The course introduces the students to the fundamental concepts of Game Theory and microeconomics and demonstrates the use of these concepts in networking research. Game theory is the discipline aimed at modeling scenarios in which rational agents have to make specific decisions that have mutual and possibly conflicting consequences. In the recent time, game theory has played a vital role in the understanding of computer and communication networks and providing insights into questions such as allocation of network resources, analysis and effects of competitive and/or cooperative agents, Internet protocols, wireless network protocols, network dynamics, queuing systems, performance optimization, and network traffic and topology.

The focus is on covering the aspects of Non-cooperative Game Theory that would be instrumental in studying selfish or malicious behaviors in various networks. Topics of interest would include (but not limited to) Network Formation, Internet Pricing, Flow Control, Routing, Medium Access Control, Network Security, Power Control (Wireless) and Spectrum Sharing (Wireless). Applications of Game Theory in various other fields, such as Economics, Business, Law and Political Science will also be illustrated in the final part of the course (the specific choice of topics will be determined through student responses during the course).

Texts:

There is no required text book. Slides and references to current articles from journals, magazines and other websites will be provided to the students and will be used in the class extensively.