NETS 2120 Scalable and Cloud Computing
What is the "cloud"? How do we build software systems and components that scale to millions of users and petabytes of data, and are "always available"? In the modern Internet, virtually all large Web services run atop multiple geographically distributed data centers: Google, Yahoo, Facebook, iTunes, Amazon, EBAY, Bing, etc. Services must scale across thousands of machines, tolerate failures, and support thousands of concurrent requests. Increasingly, the major providers (including Amazon, Google, Microsoft, HP, and IBM) are looking at "hosting" third-party applications in their data centers - forming so-called "cloud computing" services. This course, aimed at a sophomore with exposure to basic programming within the context of a single machine, focuses on the issues and programming models related to such cloud and distributed data processing technologies: how to think about dividing both data and work across large clusters of machines, both within and across data centers, how to design algorithms that do this parallel computation, and how to implement the algorithms in new frameworks such as MapReduce.
Fall
1 Course Unit

NETS 3120 Theory of Networks
Want to understand how memes spread across the Internet? How organisms exhibit flocking behavior? How the structure of a network can help predict behavior among the nodes? This course is a rigorous study of the structure and function of complex networks. From World Wide Web to networks of banks and lenders that form the financial sector, to friendship networks that influence our opinion and everyday decision-making, networks have become an integral part of our daily lives.
Fall or Spring
1 Course Unit

NETS 4120 Algorithmic Game Theory
How should an auction for scarce goods be structured if the sellers wish to maximize their revenue? How badly will traffic be snarled if drivers each selfishly try to minimize their commute time, compared to if a benevolent dictator directed traffic? How can couples be paired so that no two couples wish to swap partners in hindsight? How can you be as successful as the best horse-racing expert at betting on horse races, without knowing anything about horse racing? In this course, we will take an algorithmic perspective on problems in game theory, to solve problems such as the ones listed above. Game theory has applications in a wide variety of settings in which multiple participants with different incentives are placed in the same environment, must interact, and each "player"'s actions affect the others.
Fall or Spring
1 Course Unit