Course Title: **Advanced Computer Networks (Graduate Level)**
(Ping Ji)

Course Description:

This course covers advanced fundamental principles of computer networks. Topics include protocol mechanisms, advanced network architecture, routing algorithms, network control, network simulation schemes, network measurement approaches and implementations, traffic analysis techniques, performance evaluation concepts, and other state-of-art network research and applications. Undergraduate Computer Networks, Operating System, Algorithms are prerequisites of this course.

Text book: There is no text book for this course. Reading materials will be assigned for lectures.

Syllabus:

Protocol Mechanisms: common protocol design and implementation techniques: signaling, randomization, multiplexing, scalability, indirection, virtualization

Network architecture: Principles of Circuit Switching and Packet Switching. Lessons learned for the Internet, ATM networks, Telephone networks.

Routing algorithms: Input/Output queuing, Packet classification, Scheduling, Multicast routing, Content based routing, ad hoc routing, etc

Network Control: resource allocation, control theoretic viewpoint of closed loop control (TCP), congestion control theories

Network Simulations: Principles of discrete event simulation, Analysis of simulation output, Simulation pitfalls, The NS simulator

Network Measurement: Workload models; traffic and topology characterization, traffic sampling, network tomography.

Performance Evaluation: Introduction to simple queuing models (M/M/1), closed loop system models

Student Workload:

There will be 4 or 5 written assignments and one programming assignment, an in-class midterm exam, and a final exam or project.