Data Networks

Classes held at Jeffrey 102, Mon 14:30-15:20, Tue 16:30-17:20, Thu 15:30-16:20

Course Information

Design of communication networks involve many theoretical and practical challenges. This course will present a number of mathematical tools to develop approaches and algorithms for optimization of communication networks, and networks in general.

Instructor: Serdar Yüksel, Jeffrey Hall 415, Phone: 533-2429, E-mail: yuksel@mast.queensu.ca
Office Hour: Tuesday 14:00-15:00
Recommended Text: Control Techniques for Complex Networks, by Sean P. Meyn,
(Copies of this book are available at the Queen’s Bookstore-book is also available online-)
Supplemental Notes will be posted on the course web site
References:
Markov Chains and Stochastic Stability, by S. P. Meyn, R. L. Tweedie
Communication Network Analysis, Lecture Notes by Bruce Hajek (available online)
Data Networks, by D. Bertsekas and R. Gallager
Dynamic Programming and Optimal Control, by D. Bertsekas
Mathematics of Internet Congestion Control, by R. Srikant
Announcements: Visit http://www.mast.queensu.ca/~math484 for announcements, homeworks etc.
Grading: Assignments 10%; Midterm 25%, Project/Presentation 30%, Final 35%

Topics

- Mathematical Models for Communication Networks and the Single Queue
- Review of Markov Chains, Martingales and Stochastic Stability
- Single Queue as a Sampled Process, Poisson and General Distributions, Little’s Theorem
- Controlled Random Walk Model and the Fluid Model
- Workload and Stability
- Dynamic Programming and the Linear Programming Approach to Markov Decision Processes
- Scheduling, Routing and Flow Control
- Graph and Decentralized Algorithms
- Multiple Access Channels
- ...Project Presentations