

EE 554: Communication Networks

Instructor: Prof. Martin Haenggi, 274 Fitzpatrick, mhaenggi@nd.edu
Lecture: TH, 75min
Offered: Alternate Spring
Text: Thomas G. Robertazzi, *Computer Networks and Systems: Queueing Theory and Performance Evaluation*, 3rd Ed., Springer, 2000.
Jean-Yves Le Boudec and Patrick Thiran, *Network Calculus*, Springer, 2001.
Available at http://lrcwww.epfl.ch/PS_files/NetCal.htm

Catalog Description

Review of the OSI model and TCP/IP. Introduction to queueing systems and network calculus. Routing, flow control, and media access. Traffic modeling. Packet radio networks. Design philosophy of wireless networking standards and protocols. Emerging wireless technologies.

Course Outline

- Review of the OSI model, TCP/IP, UDP/IP, IPv6, and Internet applications (e-mail, web). Fundamentals of Markov systems, queueing models and theory, traffic modeling, and network calculus. Little's theorem and Jackson networks. Flow control, routing, channel access, and cyclic redundancy checks.
- Introduction to wireless networks. Fundamental differences to wired networks with an emphasis on the physical and link layer. Packet radio networks. Design philosophy of existing standards and protocols such as Bluetooth, GSM, IS-95, 802.11, and HiperLAN. Emerging technologies including 3G, 4G, and infrastructureless networks (mesh networks, ad hoc networks, sensor networks).

Additional References

- Ingemar Kaj, *Stochastic Modeling in Broadband Communication Systems*, siam Monographs on Mathematical Modeling and Computation, 2002.
- Dimitri Bertsekas and Robert Gallager, *Data Networks*, 2nd Ed., Prentice-Hall, 1992
- Srinivasan Keshav, *An Engineering Approach to Computer Networking*, Addison-Wesley, 1997
- James Kurose and Keith Ross, *Computer Networking - a Top-Down Approach Featuring the Internet*, 2nd Ed., Addison-Wesley, 2003.
- James Norris, *Markov Chains*, Cambridge Series in Statistical and Probabilistic Mathematics, Cambridge University Press, 1997.
- William Stallings, *Wireless Communications and Networks*, Prentice-Hall, 2001
- Jon Mark and Weihua Zhuang, *Wireless Communications and Networking*, Prentice-Hall, 2003.
- Jochen Schiller, *Mobile Communications*, Addison-Wesley, 2000.