Indian Institute of Technology Bombay

Department of Electrical Engineering

EE 764 : Wireless and Mobile Communications

Time and location: Wednesday 11:00am and Friday 11:00am at Room: EEG 101
Web page: `http://www.ee.iitb.ac.in/~bsraj/courses/ee764/`

Instructor:
Prof. Sibi Raj B Pillai
231D, Electrical Engineering
Timings: call and walk-in

Assistants:
1) Amitalok Budkuley (10407003@iitb)
2) Arneh Jain (08D07023@iitb)

Required Background: Signals and Systems (including DFT), Probability Theory (fundamentals), Communication Theory (basic modulation techniques).

Contents:

Point to Point Channels

Wireless channels, Narrow band flat fading models, Frequency selective wide band models, Additive Gaussian noise, Sampled discrete-time models.

Signal representations, Transmission and reception, ML detection, Channel Capacity, Transmission power, Bandwidth, Tradeoffs, BER computations, Coded Modulation.

MIMO channels, Capacity with side information, Diversity gain, Multiplexing gain, Wideband slow fading models and OFDM.

Fundamentals of software defined radio. Projects using software defined radio.

Multiuser Models

Uplink multiple access models, Side information and capacity, TDMA, FDMA, CDMA, OFDMA, MIMO MAC, Mobility and throughput maximization.

Downlink Broadcast models, Precoding and Beamforming, Capacity and side information.

Interference Channels, Interference Avoidance and Alignment, Capacity Results under various assumptions.

Course mechanics:
Assignments [30] (Project(GNURADIO) + Homework: modality to be announced)
2 exams [30 midsem + 40 endsem]

Textbook: Tse and Viswanath, Fundamentals of wireless communication (a must).

Reference Material:

1. D. Tse and P. Viswanath, Fundamentals of wireless commn., Cambridge 2004.
2. A. ElGamal and Y. H. Kim, Network Information Theory, Cambridge, 2011.
3. A. Goldsmith, Wireless Communications, Cambridge 2005.
4. J. G. Proakis, Digital Communications, Mc GrawHill, Edition 5, 2008.
5. Selected journal papers and other monographs(will be announced in class).