ECE 614 Communications over Fading Dispersive Channels  
(Winter 2011)

Instructor: Weihua Zhuang, EIT 4159, x35354, wzhuang@uwaterloo.ca
Lectures: Thursdays 11:30am-2:20pm @ EIT 3141
Office Hour: Mondays 1:00-2:30pm @ EIT 4159
Course Website: http://bbcrlab-pc24.uwaterloo.ca

Course Outline:

- Overview – mobile communication systems, cellular concept and frequency reuse, user mobility.
- Linear time-varying channel descriptions – complex signal representation, schematic representation of band-pass filtering operations, system functions and channel correlation functions, channel parameters, flat fading and frequency-selective fading.
- Classification of channels and channel models – long-term and short-term fading, Rayleigh and Rician fading, power spectral of diffusive signals, basic radio transmission theory, path loss, shadowing.
- Digital transmission over fading dispersive channels – diversity representation of fading channels, optimum receiver, maximum-likelihood detection, transmission performance over fading channels.
- Diversity – diversity schemes, linear combining strategies, optimum combining, SNR improvement, distribution of SNR for independent and correlated diversity channels, transmission accuracy improvement by diversity.
- Multiple access interference – cochannel interference and adjacent channel interference, multiple lognormal interferers, multiple Rayleigh/Rician interferers, distribution of interference, outage probability.
- Code-Division Multiple Access – spread spectrum modulation and multiple access schemes, modulation and demodulation in multipath and multiple access interference, capacity analysis.

Prerequisites: ECE316 and ECE411, or equivalent (subject to the approval of instructor).

Text: Lecture Notes. Available at EIT copy center (2nd floor).

Reference Books: (reserved at the DC library)


Grading: Project=35% and Final Exam=65%.