EE6002: Multi-Carrier Communications – updated on April 26, 2014

Course Contents:
Digital Communication Review: Linear symbol-by-symbol modulation, Optimal Detection in AWGN channels, ISI channels, Equalization, Multiple Access using TDMA/FDMA/CDMA schemes

Multi-carrier Systems: Motivation for Block Modulation, Single-carrier vs Multi-carrier, OFDM system, Role of FFT, Sensitivity to timing and frequency errors, Linear Precoding, PAPR reduction, Distributed and Localized mapping

OFDM Receiver Algorithms: Synchronization, Channel Estimation and Equalization, Zero forcing and MMSE algorithms, Training sequence design

Adaptive Modulation: Information theoretic approach, Water-filling solution, ~~SNR Gap analysis~~, Bit loading algorithms

Generalised Multi-carrier Systems – Block modulation with zero-padding, PN sequences, MC-DS-CDMA, interleaved FDMA (IFDMA), and DFT-precoded OFDM (SC-FDMA) –Transceiver Block Diagrams

~~Multi-user OFDM: Multi-user diversity, Resource allocation algorithms~~

MIMO-OFDM: Fundamental MIMO concepts, Spatial diversity, Spatial Multiplexing, Space-Frequency coding, introduction to Multi-user MIMO

***Evaluation details for the Course*:**

Short-test (5 marks), Mid-Sem (25 marks), CE Assignment + Annexure (10 marks), End-Sem* (45 marks), Mini-project Presentation (15 marks).
CE Assignment due on or before : Tuesday, May 13
Mini-project presentations on: Friday, May 16

* Only 1 A-4 page sized crib-sheet will be allowed for the End-Sem on Friday, May 2.

Text Book:
Y.S.Cho, J.Kim, W.Y.Yang, and C.G.Kang, "MIMO-OFDM Wireless Communications with Matlab", Wiley (Asia) and IEEE Press, 2010.

References :
(i) T.D.Chiueh and P.Y.Tsai, "OFDM Baseband Receiver Design for Wireless Communications", Wiley, 2007
(ii) L. Hanzo, M. Munster, B.J. Choi, and T.Keller, "OFDM and MC-CDMA for Broadband Multiuser Communications, WLANs, and Broadcasting", Wiley, 2003.
(iii) J. Proakis, "Digital Communications", New York - McGraw Hill, 2001
(iv) D. Tse and P. Vishwanath,"Fundamentals of Wireless Communications", Cambridge Press, 2005