Introduction to RF Systems

ECE 5022

Credit Hours:
3.00

Course Levels:
Undergraduate (1000-5000 level)
Graduate (5000-8000 level)

Course Components:
Lecture

Course Description:
Intuitive system design methods to dissect the radio modem in analog & digital domains with emphasis on: a) performance evaluation using hand calculations and simulation, and b) understanding of the interaction between RF components and radio architectures. Topics include: system parameters, propagation & antennas, noise, distortion, modulation & aerial access, phase noise, RF transceivers.

Prerequisites and Co-requisites:
Prereq or concur: 4021 or 5021, or Grad standing in Engineering, Biological Sciences, or Math and Physical Sciences.

Course Goals / Objectives:
- Understand different block-level specifications and impairments, such as S-parameters, gain, bandwidth, noise figure, P1dB, IIP3, IIP2, and phase noise, and how to relate them to performance metrics, such as BER, EVM, sensitivity and selectivity
- Evaluate the impact of different impairments in radio front-ends on link margin, including path loss and fading, interference, noise, circuit nonlinearity, and phase noise
- Learn aspects of the digital signal processing chain at both the modulation and demodulation ends
- Design and simulate (at block level) a full modem including RF, analog and digital components
**Course Topics:**
- RF Block and System Design Parameters
- Signal Propagation & Antennas
- Noise
- Distortion & Mixers
- Modulation & Aerial Access
- Phase Noise
- Transceiver Architecture & Case Studies

**Designation:**
Elective