

## **Department of Electronics and Communication Engineering**

### **Communication Systems**

Analog and Digital modulation and demodulation techniques, Random Processes, Information MAP, ML detection, matched filter receiver, SNR and BER, Information theory and Coding, Electromagnetic Maxwell's Equations, Plane Waves and Properties, Transmission Lines, Rectangular and circular waveguides, light propagation in optical fibers, dipole and monopole antennas, linear antenna arrays.

### **Signal Processing**

Continuous-time Signals: Fourier series and Fourier transform, Laplace Transform, sampling theorem and applications. Discrete-time Signals: DTFT, DFT, FFT, Z-transform, discrete-time processing of continuous-time signals. LTI systems: definition and properties, causality, stability, impulse response, convolution, poles and zeroes, frequency response. Digital Filters.

### **VLSI Design**

Diodes and Diode Circuits, BJT and MOSFET Amplifiers, Op-amp Circuits: active filters, Schmitt triggers and oscillators. Digital Number Representations, Combinational and Sequential circuits, Logic gates and their static CMOS implementations, finite state machines, propagation delay, setup and hold time, critical path delay. Data Converters circuits. Semiconductor Memories.

### **Cyber Physical Systems**

Introduction to cyber physical systems (CPS), Motivational examples and computational platforms, Discrete time and continuous-time systems, Sensing and communication for CPS, Dynamic system modeling, Stability, Controller design, Barrier Functions, Quadratic Program and Neural Network (NN) based Controller Design. State Estimation, Attack Detection and Mitigation in CPS.