

## **ELEC 4509**

### **Communications Links**

#### **Course Grading**

The breakdown for the grades will be as follows:

Two term quizzes @20%	40%
Final Exam	60%

#### **Reference Text**

Freeman, Telecommunications Transmission Handbook, Wiley

## Course Outline

### Week

#### **Section I: Transmission Fundamentals**

- 1 Decibel, telephone connection, speech transmission
- 2 Thermal noise, intermodulation, 1 dB compression, third-order intercept point, crosstalk
- 3 Signal to noise ratio, noise power ratio, noise figure, noise temperature, noise in cascaded components
- 4 AM to PM conversion, differential gain and differential phase, antenna gain, effective isotropic radiated power, G/T ratio, C/T ratio

#### **Section II: Wireless Links**

- 5 Frequency assignment, frequency interference, Earth's bulge, Fresnel clearance, reflection points, free space path loss
- 6 Rainfall attenuation, FM receiver threshold, noise planning, multipath fading, fade margin, link reliability, diversity combiners, system configuration, preemphasis, deviation
- 7 Parabolic reflector, horn feed, and periscope antennas, single and double mirror passive reflectors, antenna towers, FM receivers, repeaters, hot standby operation, pilot tones, alarms and supervisor systems

#### **Section III: Fiber-Optic Links**

- 8 Fiber structure, dispersion, loss, bandwidth-distance product, splices and connectors
- 9 Lasers, PIN diodes and APD's, modulation, fiber amplifiers, system design

#### **Section IV: Satellite Links**

- 10 Earth Space window, transponder orbit, Earth station approval, illumination levels, station margin, up link calculation
- 11 Access schemes: FDMA, TDMA, satellite-switched TDMA, SCPC, television transmission, regional systems
- 12 Earth station systems, antenna tracking system, Earth station antennas, terrestrial link interface, co-ordination contour