ELEC 4509

Communications Links

Course Outline

Week

Section I: Transmission Fundamentals

1   Decibel, hierarchal connections, bandwidth, amplitude and phase distortions

2   Thermal noise, intermodulation, 1 dB compression, third-order intercept point, crosstalk and co-channel interference

3   Signal-to-noise ratio, noise figure, noise temperature, noise in cascaded components, Y factor

4   AM-to-PM conversion, peak-to-average power ratio, differential gain and differential phase, antenna gain, effective isotropic radiated power, G/T ratio, C/T ratio

Section II: Wireless Links

5   Frequency assignment, self-interference, path profiling, earth's bulge, Fresnel clearance, reflection points, free space path loss

6   Rainfall attenuation, receiver threshold, multipath fading, fade margin, diversity combiners, predistortion and pre-emphasis, system configuration

7   Horn feed, parabolic reflector, periscope antenna, passive reflectors, antenna towers, hot standby, pilot tones, alarms

Section III: Fiber-Optic Links

8   Fiber structure, numerical aperture, cutoff frequency, modes, loss, dispersion, bandwidth-distance product, splices and connectors, Lasers, photon absorption, spontaneous emission, and stimulated emission

9   Population inversion, Bernard-Duraffourg condition, Fabry-Perot cavity, Mach-Zender modulator, Detectors, PIN diode, Avalanche photodiode, SNR, fiber amplifiers, system design

Section IV: Satellite Links

10   Earth Space frequency windows, GEO orbit, down-link calculation, earth station G/T, illumination levels, station margin, up-link calculation, earth station EIRP

11   Access schemes: FDMA, TDMA, multiple spot beams, manual pointing, monopulse tracking systems, spherical trigonometry

| 12 | Low Earth Orbit, inter-satellite link pointing, earth station F/D, corrugated horn feed, 3 axis stabilized satellite bus, satellite transponder frequency organization |

Course Grading

Two midterm exams at 20% each	40%
Final exam	60%

Reference Text

Freeman, Telecommunications Transmission Handbook, Third Edition, Wiley