**Ahsanullah University of Science and Technology**

**Department of Computer Science and Engineering**

*Course Outline*

*CSE 4255: Telecommunication*

**Course Objectives:** The objective of the course is to give an introduction to the telecommunications, fundamentals of wireless communication system, the wireless network architectures and protocols. Topics of study includes an overview of wired telephony system; switching technique; wireless telecommunication system; cellular telephony; GSM; CDMA; signal propagation models; fading in the mobile environment; multiple access techniques; modulation techniques; satellite communication and wireless networking standards IEEE-802.11.

**Text Books:** Wireless Communications and Networks; 2nd edition---William Stallings

Wireless Communications Principles and Practice; 2nd edition---T. S. Rappaport

**Course Content:**

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| **Week** | **Topics** | **Reference Chapters** |
| 1 | **Introduction to telecommunication**   * Defination, basic elements, some terminology * Wired Telephone Netwwork   + Public Switched Telephone Network   + Digital Subscriber Line   + Asymmetric DSL * Switching Technique   + Crossbar switching,   + Multistage switching | Stalling  Chapter-2;  Forouzan Chapters: 8, 9 |
| 2-3 | **Cellular Concept:**   * Frequency Reuse * Cellular planning for maximizing the number of users in given geographical area * Operation of Cellular System * Handoff * Interference * Trunking efficiency * Improvement capacity | Stalling  Chapter: 10  Rappaport Chapter: 2 |
| 4-5 | **Generation of Cellular Networks:**   * First Generation: AMPS * Second Generation—GSM * 3rd to 4th Generation | Stalling  Chapter: 10 |
| 6-7 | **Antennas and Mobile Radio Propagation—Large Scale Path Loss**   * Antennas   + Radiation Pattern   + Antenna Type   + Antenna Gain * Mobile Radio Propagation   + Introduction to Radio Wave Propagation     - Propagation mode: Ground Wave Propagation, Sky Wave Propagation, Line of Sight Propagation   + Free Space Propagation Model   + The Three Basic Propagation Mechanisms     - Ground Reflection (Two Ray) Model     - Kniff-edge Refraction Model     - Scattering—Radar Cross Section Model | Stalling Chapter: 5  Rappaport Chapter: 3 |
| 8 | **Small Scale Multipath Propagation**   * Factors Influencing Small Scale Fading * Parameters of Mobile Multipath Channels   + Time Dispersion Parameters   + Coherence Bandwidth   + Doppler Spread and Coherence Time * Types of Small Scaling Fading   + Fading Effects due to multipath Time Delay Spread     - Flat Fading   + Fading Effect due to Doppler Spread     - Fast Fading     - Slow Fading * Rayleigh Fading Distribution | Stalling Chapter: 5  Rappaport Chapter: 5 |
| 9 | **Modulation Techniques**   * Spread Spectrum Modulation   + Frequency Hopping Spread Spectrum   + Direct Sequence Spread Spectrum | Stalling Chapter: 7 |
| 10 | **Multiple Access Techniques**   * OFDMA * SCFDMA | Documents provided. |
| 11-12 | **Wireless Networking and Wireless Networking Standards**   * Brief Introduction of Satellite Communication * Satellite Parameters and Configurations | Stalling Chapter: 09 |
| 13 | **Advanced Topics in Wireless Networks:**   * Research Trends * Multi-hop/ ad hoc Wireless Networks * Wireless Sensor Networks * Cloud Computing |  |
| 14 | Revision |  |

**Grading**:

Attendance: 10%

Quiz: 20%

Final: 70%