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| **Course – 70 Title: Wireless and Cellular Communication** |  |
| **Course No.: CCE - 422 Credit : 3.00 Contact Hours: 3** | **Total Marks: 100** |

**11.1 Rationale:**

This course helps to acquire computer science students for fundamentals of various practical and theoretical concepts of wireless communications, which range from wireless transmissions to wireless cellular systems. Technical concepts of design, implementation, and invention of wireless communication systems are also included.

**11.2 Objectives:**

1. By the end of the course, the student will be able to analyze and design wireless and mobile cellular systems.
2. By the end of the course, the student will have the ability to work in advanced research wireless and mobile cellular programs.

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| **11.3**  **Learning Outcomes** | **11.4**  **Course Content** | **11.5**  **Teaching Strategy/ Learning Experience** | **11.6 Assessment Strategy** |
| * Explain various wireless network concepts * Identify and describe different wireless LAN technologies | **Wireless Network concepts:** frequency reuse, handoff strategies, interference and system capacity, grade of service, improving capacity and coverage; Wireless LAN Technology | Lecture/exercise | Essay, Short answer |
| * Explain protocol architecture * Discuss the activity of physical layer and MAC layer * Define mobile IP * Apply mobile IP concept in cellular communication | **IEEE 802.11:** standard, protocol architecture, physical layer and media access control; Mobile IP; Wireless Application Protocol; IEEE 802.16 Broadband Wireless Access | Lecture/exercise | Essay, Short answer |
| * Distinguish among generation of network * Describe WLAN architecture * Analyze pitfall of current cellular network. | **Modern Wireless Communication Systems:** Second generation (2G) Cellular networks, third generation (3D) wireless networks, wireless local loop (WLL) and LMDS, wireless local area networks (WLANs), Bluetooth Personal area networks (PANs) | Lecture/exercise | Essay, Short answer |
| * Define frequency reuse. * Describe different strategy of channel assignment * Create new channel assignment strategy. * Define handoff. * Contrast different handoff strategy | **The cellular Concept-System Design Fundamentals:** Introduction, frequency reuse, channel assignment, strategies, handoff strategies, interference and system capacity, trunking and grade of service, improving coverage and capacity in cellular systems | Lecture/exercise | Essay, Short answer |
| * Learn different propagation model * Define path loss * Analyze the procedure to reduce large scale path loss | **Mobile Radio Propagation - Large scale path loss:** Introduction to radio wave propagation, free space propagation model, relating power to electric field, basic propagation mechanisms, reflection, ground reflection, diffraction, scattering, outdoor and indoor propagation models | Lecture/exercise | Essay, Short answer |
| * Learn small scale multipath propagation model * Define small scale fading * Explain different types of small scale of fading * Discuss model for multipath fading channel | **Mobile Radio Propagation - Small scale Fading and Multi-path:** Small scale multi-path propagation, Impulse response model of a multi-path channel, small-scale multi-path measurements, parameters of mobile multi-path channels, types of small scale fading, Rayleigh and Ricean distributions, statistical models for multi ­path fading channels, theory of multi-path shape factors for small scale fading wireless channels | Lecture/exercise | Essay, Short answer |
| * Define modulation * Learn and explain different modulation technique * Contrast among different modulation technique | **Modulation techniques for mobile radio:** Frequency modulation, amplitude modulation, angle modulation, digital modulation, line coding, pulse shaping techniques, geometric representation of modulation signals, linear modulation techniques | Lecture/exercise | Essay, Short answer |
| * Discuss fundamental of equalization * Apply algorithm of equalization * Learn fundamental of channel coding | **Equalization, Diversity and Channel Coding:** Introduction, fundamentals of equalization, linear inequalities, nonlinear equalization, algorithms for adaptive equalization, diversity techniques, interleaving, fundamentals of channel coding | Lecture/exercise | Essay, Short answer |

**RECOMMENDED BOOKS AND PERIODICALS**