

23A04703c	<b>CELLULAR &amp; MOBILE COMMUNICATIONS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Professional Electives</b>	3	0	0	3

**Course Objectives:**

1. To explain the basic cellular system and its working.
2. To understand the impact of multipath fading channels and techniques to mitigate fading effects in cellular communication.
3. To explore frequency management, channel assignment strategies, and different types of handoffs in cellular networks.
4. To analyze the performance of mobile antennas, interference issues, and cellular system design principles.
5. To evaluate system performance metrics such as dropped call rates, handoff strategies, and spectrum efficiency.

**Course Outcomes:****After completing the course, the student will be able to,**

1. Understand the basic cellular system and its working.
2. Explain the impairments caused by multipath fading and methods to mitigate fading effects in mobile communication.
3. Apply concepts of cellular communication to solve problems related to mobile antennas and system design.
4. Analyze co-channel and non-co-channel interferences, different types of handoffs, and dropped call rates.
5. Evaluate the performance of cellular systems, including signal reception, handoff efficiency, and spectrum utilization.

**UNIT I**

**Cellular Mobile Radio Systems:** Introduction to Cellular Mobile system, basic cellular system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems.

**UNIT II**

**Elements of Cellular Radio System Design:** General description of the problem, concept of frequency channels, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system, Cell splitting, consideration of the components of cellular system.

**Interference:** Introduction to Co-channel interference, real time co-channel interference, Co-channel measurement, design of Antenna system, Antenna parameters and their effects, diversity receiver, non-co-channel interference-different types.

### UNIT III

**Cell Coverage for Signal and Traffic:** Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long-distance propagation antenna height gain, form of a point-to-point model.

### UNIT IV

**Cell Site and Mobile Antennas:** Sum and difference patterns and their synthesis, Omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas.

**Frequency Management and Channel Assignment:** Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non fixed channel assignment.

### UNIT V

**Handoff:** Handoff, dropped calls and cell splitting, types of handoffs, handoff invitation, delaying handoff, forced handoff, mobile assigned handoff. Intersystem handoff, cell splitting, micro cells, vehicle locating methods, dropped call rates and their evaluation.

**System Evaluations:** Performance evaluation, Signal evaluation, Measurement of average received level and level crossings, Spectrum efficiency evaluation.

### TEXT BOOKS:

1. W .C. Y. Lee, “Mobile cellular telecommunications”, Tata Mc-Graw Hill, 2<sup>nd</sup> Edition, 2006.
2. Theodore. S. Rapport, “Wireless communications”, Pearson Education, 2<sup>nd</sup>Edn., 2002.

### REFERENCES:

1. Gordon L. Stuber, “Principles of Mobile communications”, Springer International 2<sup>nd</sup> Edition, 2007.
2. Lee , “Wireless and Mobile Communications”, Mc Graw Hills, 3<sup>rd</sup> Edition, 2006.
3. Jon W.Mark and WeihuaZhqung, “Wireless communications and Networking”, PHI, 2005.
4. R.Blake, “Wireless communication Technology”, Thompson Asia Pvt.Ltd., 2004.