Course Type	Course Code	Name of the Course	L	T	P	Credits
DC	NECC503	**Wireless Networks**	3	1	0	4

Course Objective
• To understand the concepts of various wireless technologies • To review the concepts of wireless networks • To explore the emerging wireless technologies and their potential impact
Learning Outcomes
At the end of the course the student should be able to, • To design the various wireless networks. • To be able to design the 4G and LTE networks • To design application sensor networks. • To design Heterogeneous networks

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Introduction to fading in Wireless Communication. Multi-antenna systems; link reliability, carrier aggregation, capacity limits with and without CSI, diversity, and multiplexing trade-offs.	6L+2T	To get the exposure towards Wireless Multi-antenna Systems.
2	MIMO Equalization techniques (ZF/MMSE). Multiuser Communication Systems: Uplink communication Protocol, Downlink Communication Protocols, Precoding and Beamforming for multi-user systems.	6L+2T	To learn the concepts of Multi-user Wireless Systems
3	CELLULAR NETWORKS Migration to 3G Networks – IMT 2000 and UMTS – UMTS Architecture – User Equipment – Radio Network Subsystem – UTRAN – Node B – RNC functions – USIM – Protocol Stack – CS and PS Domains – IMS Architecture – Handover – 3.5G and 3.9G a brief discussion – 4G LAN and Cellular Networks – LTE – Control Plane – NAS and RRC – User Plane – PDCP, RLC and MAC – WiMax IEEE 802.16d/e – WiMax Internetworking with 3GPP – Introduction to 5G Networks	9L+3T	To get the knowledge on the concepts of Cellular Networks
4	AD HOC NETWORKS Mobile Ad –Hoc Networks - Internet-based mobile ad-hoc networking communication strategies, Routing algorithms – Proactive routing: destination sequenced Distance Vector Routing (DSDV), Reactive routing: Dynamic Source Routing (DSR), Ad hoc On-Demand Distance Vector Routing (AODV), Hybrid Routing: Zone Based Routing (ZRP).	6L+2T	To understand the concept and designing Ad hoc Networks
5	SENSOR NETWORKS Sensor Networks – Role in Pervasive Computing – In Network Processing and Data Dissemination – Sensor Databases – Data Management in Wireless Mobile Environments –	9L+3T	To acquire the knowledge of building sensor networks
6	WIRELESS MESH NETWORKS Wireless Mesh Networks – Architecture – Mesh Routers – Mesh Clients – Routing – Cross Layer Approach – Security Aspects of Various Layers in WMN – Applications of Sensor and Mesh networks	6L+2T	Able to build the wireless sensor networks
	Total:	42L+14T	

Text Books:

1. **Abd-Elhamid M. Taha and Hossam S. Hassanein and Najah Abu Ali, —LTE, LTEAdvanced and Wimax towards IMT-advanced networks‖ John Wiley & Sons, 2012.**
2. **Holger Karl and Andreas Willing, —Protocols and Architecture for Wireless Sensor Network‖, John Wiley & Sons, 2007.**
3. **Tse, David, and Pramod Viswanath. *Fundamentals of wireless communication*. Cambridge university press, 2005.**

Reference Books:

1. **Jochen Schiller, — Mobile Communication‖, Pearson education, 2nd edition 2005.**
2. **Juha Korhonen, — Introduction to 3G Mobile Communication‖, Artech House, 2003.**
3. **Larry J. Greenstein, Andrea J. Goldsmith, — Principles of Cognitive Radio‖, Cambridge University press, 2013.**
4. **Vijay. K. Garg, — Wireless Communication and Networking‖, Morgan Kaufmann Publishers, 2007.**
5. **Harri Holma and Antti Toskala, —HSDPA/HSUPA for UMTS‖, John Wiley & Sons, 2006**