BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE,
PILANI, HYDERABAD CAMPUS
SECOND SEMESTER 2023-24

Course Handout (Part-I)

Date: 01/01/2024

Course No. **: EEE G592**

Course Title **: Mobile and Personal Communications**

Instructor-in-charge : Dr. Prashant K. Wali

1. Scope and Objective:

With the exponential increase in the number of mobile devices there has been a lot of advancement in industrial and academic research towards designing and modeling the new heterogeneous wireless communication networks. The advances in the wireless communications have been in the new techniques for modulation, multiple access, and network designing.

a) This course aims to introduce the students to the fundamentals of wireless communications and expose them to the research options available for applications in the real world implementation of the next generation wireless networks.

b) The course will introduce the students to current trends in the wireless industry with a specific focus on 4G communication networks.

c) The course aims to equip students with tools for designing the engineering aspects of the wireless communications.

2.Course Description: History of mobile radio; the mobile radio signal environment; review of statistical techniques; pathover flat as well as hilly terrain; effects of RF system design on propagation; received signal envelope and phase characteristics; modulation schemes employed; functional design of mobile radio systems, diversity schemes-space; frequency and polarization diversity; mobile radio system functional design; signal error analysis versus performance criteria; multiple access schemes; classification of the concepts of sensitive topics; new concepts data transmission via cellular; spectrum and technology of WLL.

2. Text Book(s):

1. Andrea Goldsmith, Wireless Communications, Cambridge University Press.
2. Theodore Rappaport, Wireless Communications: Principles and Practice

3. Reference Book(s):

1. David Tse and Pramod Viswanath , Fundamentals of Wireless Communications, Cambridge University Press.
2. Stefan Sesia, Issam Toufik and Mathew Baker, "LTE-The UMTS Long Term Evolution, From Theory to Practice", Wiley, 2nd Edition

4. Course Plan:

Lecture No.	Topic	Learning Objective	Ref. To TB/RB
1	Evolution of wireless communications and technologies	How wireless communication has evolved, wireless systems, cellular networks.	Text Book [1,2] Ref [1]
2 - 4.	Wireless Channel Modeling - Large Scale Fading	Path Loss, Shadowing, Combined Path Loss and Shadowing, Outage Probability	Text Book [1,2]
5-16	Wireless Channel Modeling – Small Scale Narrowband Fading	Time varying channel impulse response, Doppler Spread, Narrowband Fading Models, Autocorrelation, Cross Correlation, Power Spectral Density Slow Fading, Fast Fading, Envelope and Power Distributions, Coherence Time, Coherence Bandwidth, Discrete Time Models, Capacity Concept for wireless channels	Text Book [1], Ref [1]
17-19	Small Scale Wideband Fading and ISI	Frequency Selective wireless channel, ISI, Delay Spread, Mean Excess Delay.	Text Book [1], Ref [1]
20-35	Point-to-point communication: detection, diversity, and channel uncertainty	Point-to-Point Communication: Detection, Diversity and Channel Uncertainty, Time Diversity, Frequency Diversity (OFDM), Space Diversity - Transmit Diversity, Receive Diversity, MIMO.	Text Book [1], Ref [1]
36-42	Wireless Standards, WLAN, Cellular Standards - 4G LTE	4G Physical Layer Frame Structure, Control channels, Data channels, Traffic Scheduling	Ref Book [2], published papers and Internet Resources.

5. Evaluation Scheme

Component	Duration	Weightage	Marks	Date & Time	Evaluation type
Mid sem	90 min	30%	60	-	Closed Book
Lab		20%	40	-	Open Book
Term Project		20%	40	-	Open Book
Compre. Exam.	3 hours	30%	60	-	Closed Book
Total			**200**		

6. Chamber Consultation Hour: To be announced in the class

email: wali@hyderabad.bits-pilani.ac.in

7. Notices: EEE Notice Board and CMS.

8. Make-up Examination:

Make-up examination will be given only in **extremely genuine cases** for which prior permission of the instructor-in-charge is required.

9. Academic Honesty and Integrity Policy: Academic honesty and integrity areto be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor-in-charge
EEE G592