Course Title	**Wireless Communication**
Course Code	**EE5322**
No. of Credit Hrs (Lecture + Tutorial + Lab)	**3 (2+0+1)**
No. of Contact Hrs (Lecture + Tutorial + Lab)	**4 (2+0+2)**
Level-Year	**9/10-5**
Prerequisite (if any)	**EE3307**

1) Course Objectives:

This course provides a comprehensive overview and advanced knowledge of modern mobile and wireless communication systems. The course gives emphasis to understanding the challenges and opportunities brought by the wireless medium in designing current and future wireless communication systems and networks.

2) Expected Learning Outcomes:

After completing this course, the students should be able to:

1. Define and explain the evolution of wireless standards across four generations of cellular networks. PLO1 [1]
2. Apply cellular concepts to evaluate signal reception and performance in wireless communication systems. PLO1 [1]
3. Analyze and solve problems related to key techniques used in wireless communication. PLO3 [6]
4. Evaluate data rate and error performance of wireless communication methods. PLO3 [6]
5. Design and simulate simple wireless communication system models, including 3G (CDMA) and 4G (OFDM) technologies. PLO2 [2]
6. Conduct laboratory experiments on essential wireless communication techniques and interpret results. PLO3 [6]
7. Communicate findings effectively by preparing structured laboratory reports. PLO8 [3]

3) Course Contents:

1. Overview of digital wireless communications and cellular concept and interference.
2. Wireless fading channel modelling and characterization.
3. Modulation and detection performance over fading channels.
4. Equalization techniques; multi-carrier systems.
5. Multiple-access schemes spread spectrum techniques.
6. Introduction to multiple antenna systems.
7. Receiver and transmitter diversity techniques.
8. Information theory -Channel coding (Hamming code – Convolutional code).
9. Introduction to mobile communications generations (From 2G to 5G).

4) Lab experiments:

1. Wireless Channel Modelling: Simulation of propagation models and pathloss in cellular communication (MATLAB/Octave/Scilab/Python).
2. Performance evaluation of BPSK signals under fading channels using MATLAB/Octave/Scilab/Python or by using hardware kits.
3. Equalization and detection of QPSK signals under Rayleigh flat fading channels (MATLAB/Octave/Scilab/Python).
4. Performance evaluation of multicarrier systems under Rayleigh fading channel.
5. Spread spectrum techniques: Direct sequence spread spectrum
6. Spread spectrum techniques: Frequency hopping spread spectrum
7. Performance comparison of various diversity techniques under fading channel.

5) Teaching Methods:

- Lectures and Discussion
- Videos
- Self-learning
- Laboratory demonstrations

6) Mode of Evaluation: Course Assessment Methods

- Quizzes , Assignment, Homeworks, Reports, Presentations etc.
- Lab Work
- Mid Exam
- Final Exam

Evaluation

No	Assessment Activities *	Percentage
1.	Assignments/Quizzes/HomeWorks/Mini-Projects/Presentations/Reports+Quizzes	15%
2.	Mid Exam	25%
3.	Lab/Tutorial (Lab Exam)	10%
4.	Lab/Tutorial (Lab Reports)	10%
5.	Final Exam	40%

7) Textbook(s):

- Wireless communications by Andreas Molisch, Wiley-IEEE Press, 2nd Ed, 2011.

8) References:

- Wireless Communications - Principles and Practice by T. S. Rappaport. 2nd Ed. Prentice Hall, 2002
- Wireless Communications by Andrea Goldsmith. 1st Ed. Cambridge University Press, 2005.
- Fundamentals of Wireless Communication by David Tse, Pramod Viswanath . 1st Ed. Cambridge University Press, 2005.