



Gyanmanjari
Innovative University

Course Syllabus
Gyanmanjari Institute of Technology
Semester-5

Subject: Wireless & Mobile Communication - BETEC15308

Type of course: Professional Elective Courses

Prerequisite: Analog Communication Digital Communication Electromagnetic Waves

Rationale:

Wireless and mobile communication has become a fundamental part of modern communication systems, supporting applications ranging from voice and data services to IoT and smart infrastructure. This course provides essential knowledge of wireless propagation, cellular concepts, and modern communication technologies such as 4G and 5G.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P		C	Theory Marks		Practical Marks		
			ESE		MSE	V	P	ALA	
3	0	2	4	60	30	10	20	30	150

Legends: CI-Classroom Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Unit No.	Course content	Hrs	% Weight age
1.	Introduction to Wireless Communication and Wireless Propagation Evolution and importance of wireless communication systems, comparison between wired and wireless communication, applications and services, electromagnetic spectrum and frequency allocation, overview of wireless communication standards and systems. Mechanisms of radio wave propagation including reflection, diffraction and scattering, free space propagation model, path loss and shadowing, multipath propagation effects	14	30%



2.	Cellular Communication Concepts Fundamentals of cellular systems, frequency reuse techniques, channel assignment strategies, handoff mechanisms and types, interference management, capacity improvement techniques such as cell splitting and sectoring.	08	15%
3.	Multiple Access Techniques Principles of multiple access in wireless communication, frequency division multiple access, time division multiple access, code division multiple access, orthogonal frequency division multiple access, spread spectrum techniques and comparative analysis of access methods.	07	15%
4.	Wireless Communication Systems and Standards Architecture and operation of GSM systems, basics of CDMA systems, introduction to third and fourth generation systems including LTE, overview of fifth generation (5G) technology, wireless local area networks, Bluetooth and other short-range communication technologies.	08	15%
5.	Mobile Communication and Emerging Technologies Concept of mobility and mobile IP, handoff management in mobile networks, introduction to wireless sensor networks, role of wireless communication in Internet of Things, basics of MIMO systems, recent advancements and future trends in wireless communication.	08	25%

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	Smart Wireless Communication System using IoT Integration Students will study how wireless communication is integrated with IoT systems in real-world applications such as smart homes, healthcare, or industrial automation. They will analyze system architecture, communication protocols, and devices involved. Students will also propose a smart solution using mobile communication and evaluate its benefits. Upload the document on the GMIU Web Portal.	10
2	Design and Analysis of a Wireless Communication System Students will design a basic wireless communication model or simulation using tools such as MATLAB or any simulation platform. Further, they will enhance the system using modern techniques like OFDM, MIMO, or 5G concepts. A detailed report including results and analysis must be uploaded on the GMIU Web Portal.	10



3	<p>Emerging Trends in Wireless and Mobile Communication Students will prepare a presentation on modern advancements in wireless communication such as 5G, IoT, satellite internet, or smart cities. The presentation should include working principles, architecture, applications, advantages, and future scope. Students must also include a comparison with older technologies. Upload PPT on the GMIU Web Portal.</p>	10
Total		30

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20%	30%	15%	15%	20%	0%

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course the students should be able to:	
CO1	Explain fundamentals of wireless communication systems and analyze radio wave and propagation mechanisms
CO2	Apply cellular principles such as frequency reuse, handoff, and interference management in mobile communication systems.
CO3	Compare and evaluate different multiple access techniques used in wireless communication.
CO4	Describe the architecture and operation of modern wireless systems such as GSM, LTE, and 5G.
CO5	Interpret advanced concepts including mobile IP, IoT, MIMO systems, and emerging wireless technologies.

List of Practical:

Sr. No	Descriptions	Unit No	Hrs
1.	Study of basic wireless communication system components and block diagrams.	1	2
2.	Measurement and analysis of signal strength at different locations.	1	2
3.	Study of propagation mechanisms (reflection, diffraction, scattering).	1	2
4.	Study of cellular communication systems and frequency reuse concept.	2	2



5.	Study of handoff (handover) mechanisms in mobile communication.	2	2
6.	Analysis of interference and capacity improvement techniques (cell splitting, sectoring).	2	2
7.	Study and simulation of FDMA, TDMA, and CDMA techniques.	3	2
8.	Comparative analysis of multiple access techniques.	3	2
9.	Study of spread spectrum techniques.	3	2
10	Analysis of GSM architecture and working.	4	2
11.	Study of CDMA system basics.	4	2
12	Study of LTE and 5G network architecture.	4	2
13	Study of wireless sensor networks and IoT applications.	5	2
14	Introduction to MIMO systems and modern communication techniques.	5	2
15	Mini project: Design and analysis of a wireless communication system using tools like MATLAB or IoT-based concepts.	5	2
TOTAL			30

Instructional Method:

The course delivery method will depend upon the requirement of content and the needs of students. The teacher, in addition to conventional teaching methods by black board, may also use any tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in the laboratory.

Reference Books:

- [1] T.S. Rappaport, Wireless Communications: Principles and Practice, Pearson Education
- [2] Andrea Goldsmith, Wireless Communications, Cambridge University Press
- [3] Jochen Schiller, Mobile Communications, Pearson Education
- [4] Vijay K. Garg, Wireless Communications and Networking, Morgan Kaufmann
- [5] Dharma Prakash Agrawal, Introduction to Wireless and Mobile Systems, Cengage Learning