Course Code	21ECE324T	Course Name	ADVANCED MOBILE COMMUNICATION SYSTEMS	Course Category	E	PROFESSIONAL ELECTIVE	L	T	P	C
							3	0	0	3

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	ECE	Data Book / Codes / Standards		Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1:	introducing recent advancements and growing trends in mobile telecommunications
CLR-2:	figure out the methods to improve the Data Rates in mobile communication
CLR-3:	inferring technical requirements for 5G, network architecture
CLR-4:	acquire the knowledge of Network Planning and Deployment techniques
CLR-5:	analyzing security techniques and Applications of Advanced Mobile communication system

Course Outcomes (CO):	At the end of this course, learners will be able to:	Program Outcomes (PO)												Program Specific Outcomes		
		1	2	3	4	5	6	7	8	9	10	11	12			
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
CO-1:	examine the development, challenges and requirements of mobile communications	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-2:	interpret the methods to improve the data rate	3	-	2	-	-	-	-	-	-	-	-	-	-	-	-
CO-3:	connect the layers of communication systems	-	-	-	3	-	-	-	-	-	-	-	-	-	2	-
CO-4:	analyze the techniques of Planning and deployment of communication network	-	-	-	2	-	-	-	-	3	-	-	-	-	-	-
CO-5:	summarize the security, services and applications of Next generation communication techniques	-	2	-	-	-	-	-	-	-	-	-	3	-	-	-

Unit-1 - Introduction — **9 Hour**

Overview -What Is 5G? -Background -Research and Challenges for Electronics -Expected 5G in Practice - 5G and Security -Motivations -5G Standardization and Regulation -Global Standardization in 5G Era. 5G Requirements Based on ITU- The Technical Specifications of 3GPP-The 5 G Security.

Case Study: Mobile Network Operators and Mobile Device Manufacturers in India

Unit-2 - Data Rates in Mobile Communication — **9 Hour**

Fundamental Constraints in achieving High Data Rates Noise-limited scenarios Interference-limited scenarios Higher-order Modulation, Multi carrier modulation Wider bandwidth, Spectrum Composition Low frequency spectrum, capacity and coverage, spectrum for 5GNR, unlicensed mm waves bands, Terahertz spectrum, spectrum requirements for 6G: SUB-6.

Unit-3 - Radio Network — **9 Hour**

Radio access technology-Orthogonal Frequency Division Multiplexing- Channel estimation and equalization- Multiple-Input Multiple-Output Techniques-Advanced MIMO-Radio network architecture and Interfaces.

Case Study: The Role of 5G and beyond in the Cyber-World

Unit-4 - Network Planning and Deployment — **9 Hour**

Core and Transmission Network Dimensioning- Radio Network Planning- Core and Radio Network Deployment Scenarios- Standalone and Non-Standalone Deployment Scenarios- Network Interfaces and Elements-core deployment-Measurements.

Case Study : Security Opportunities for Stakeholders

Unit-5 - Security Services and Applications — **9 Hour**

Security Threats and Challenges- Security Implications in 5G Environments and Use Cases - Security Layers- Device Security- Security between Network Entities, Vehicle Communications- Machine Learning and Artificial Intelligence.

Case Study: The concept and vision of 6G Massive IoT

Learning Resources	1. 5G explained: security and deployment of advanced mobile communications by Jyrki T.J. Penttinen. Hoboken, NJ, USA: John Wiley & Sons, Inc., 2019. 2. 6G wireless communications and mobile networking by xianzhong Xie, Bo Rong, Michel Kadoch-Bentham books	3. Rappaport.T.S.," Wireless Communications: Principles and Practice", 2nd Edition, Pearson, 2011 4. Chiller, "Mobile Communications", Pearson Education Asia Ltd., Reprint 2012

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (CLA)				Summative Final Examination (40% weightage)	
		Formative CLA-1 Average of unit test (50%)		Life-Long Learning CLA-2 (10%)			
		Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	15%	-	20%	-	30%	-
Level 2	Understand	30%	-	25%	-	40%	-
Level 3	Apply	40%	-	35%	-	30%	-
Level 4	Analyze	30%	-	20%	-	-	-
Level 5	Evaluate	-	-	-	-	-	-
Level 6	Create	-	-	-	-	-	-
	Total	100 %		100 %		100 %	

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1 Mr. Raji Kumar, Sr. Manager Core Corporation (Airtel)	1 Dr. Meenakshi, Professor of ECE, CEG, Anna University, meena68@annauniv.edu	1 Dr.C.T. Manimegalai, SRMIST