Course Type	Course Code	Name of Course	L	T	P	Credit
DC	NECC534	Advanced Antenna Theory	3	1	0	4

Course Objective
This course will enable the students to study Antennas/Antenna array & their characteristics and propagation patterns. It will expose students to application of particular antenna in particular communication system, and to make them aware of design guidelines and analysis of different
Learning Outcomes
At the end of this module, students are expected to be able to • Recognize the different types of antennas & their utilization as required in different communication systems • Classify and analysis antennas with applications • Comprehend EM wave propagation effects & pattern in different media

Module No.	Topics to be Covered	Lecture +Tutorial Hours	Learning Outcome
1	Introduction to Antenna: Antenna Types, Radiation mechanism, Fundamental parameters of Antennas. Radiation Integrals and Auxiliary Potential Functions: Vector Potential for Electric and magnetic Current Sources, Electric and Magnetic fields for Electric and Magnetic Current Sources, Solution of Inhomogeneous vector Potential Wave Equation, Far Field radiation, Duality Theorem, Reciprocity and Reaction Theorem.	10L+4T	This unit will help students to get information about different parameters of Antennas.
2	Wire and Loop Antenna: Infinitesimal dipole its radiation field, small dipole, finite length dipole, half wave length dipole, and their applications. Comparison of small loop with short dipole, Loop antenna radiation pattern its parameters and their application.	10L+4T	This unit will help students in understanding different single element antennas.
3	Antenna Array analysis and Synthesis: Linear arrays, Array of two and N- isotropic point sources, principle of pattern Multiplication, linear arrays of n elements, broadside, End-fire radiation pattern, directivity, Beamwidth and null directions, array factor. Mutual impedance between Linear Elements, Mutual Coupling in Arrays.	10L+4T	This unit will help students in understanding different array antennas.
4	Analysis of microstrip patch, slot antenna, analysis of aperture antenna and antenna array, Antenna RCS, and RCS reduction.	12+2T	This will help in designing modern antennas.
	Total	**42L+14T**	

Text Book:

1. C. A. Ballanis , "Antenna Theory, Analysis and Design " , John Wiley & Sons, Third edition , 2005.

Reference Books:

1. John D. Kraus and RonalatoryMarhefka, "Antennas and wave propagation", Tata McGraw-Hill Book Company, 2002.
2. E.C.Jordan and Balmain, "Electro Magnetic Waves and Radiating Systems", PHI, 1968, Reprint 2003.
3. L.V. Blake and M.W. long, "Antennas, Fundamentals, Design, Measurement" Third Edition, SciTech publishing, 2009.