



National Institute of Technology Meghalaya
An Institute of National Importance

CURRICULUM

Programme	Bachelor of Technology in Electronics and Communication Engineering	Year of Regulation	2018-19
Department	Electronics and Communication Engineering	Semester	VIII

Course Code	Course Name	Credit Structure				Marks Distribution				
		L	T	P	C	INT	MID	END	Total	
EC 414	Radar Engineering	3	0	0	3	50	50	100	200	
Course Objectives	To understand the fundamentals of radar and its parameters	Course Outcomes	CO1	Able to acquire the knowledge about fundamentals radar and its parameters						
	To familiarize with the concepts of different radar types		CO2	Able to familiarize with the basic concepts of different radar types						
	To introduce idea of radar signals & clutter		CO3	Able to understand basics of radar signals & clutter						
	To comprehend various types of devices and radar systems		CO4	Able to analyse various devices and radar systems						

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
1	CO1	3	3	2	2	1	-	-	-	-	-	-	-	3	2	2	-
2	CO2	3	3	2	2	1	-	-	-	-	-	-	-	3	2	2	-
3	CO3	3	3	2	2	1	-	-	-	-	-	-	-	3	2	2	-
4	CO4	3	3	2	2	1	-	-	-	-	-	-	-	3	2	2	-
5	CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SYLLABUS

No.	Content	Hours	COs
I	Introduction: Historical background, radar terminology, radar band designations, Radar block diagram, and radar equation: detection of signals in noise and signal-to-noise ratio, Probabilities of detection & False alarm, integration of radar pulses, radar cross section, distributed targets, Transmitted power, pulse-repetition frequency, antenna parameters & system losses, introduction to radar clutter.	09	CO1, CO2
II	Radar types: Pulse radars and CW radars, Advantages of coherent radar, Doppler radar and MTI: Doppler effect, delay-line cancellers, blind speeds, staggered PRFs, Digital filter bank, Moving Target Detector, limitations of MTI, tracking with radar, mono pulse tracking, conical scan, limitation to tracking accuracy	9	CO1, CO2
III	Radar signals & clutter: Basic radar measurement, theoretical accuracy of radar measurements, Range and velocity ambiguities, the ambiguity diagram, pulse compression-principles, the matched filter, chirp waveforms, Waveform design: nonlinear FM, phase codes, waveform generation and compression. Descriptions of land & sea clutter, statistical models for surface clutter, detection of targets in clutter.	9	CO3
IV	Devices and radar systems: Radar transmitter: Solid-state RF power source, Magnetron, other RF power sources, Radar receiver: Super heterodyne receiver, receiver noise figure, duplexers & diplexers, Receiver protectors, Applications: Electronic Warfare: ESM, ECM, ECCM; super resolution, IFM, types of jammers, Stealth and counter-stealth: stealth techniques for aircraft and other target types, low frequency and UWB radar, System design examples	8	CO4
Total Hours		36	

Essential Readings

1. M. I. Skolnik, "Introduction to Radar Systems ", Tata- MacGraw Hill, 3rd Edition, 2001.
2. M. H. Carpentier, "Principles of Modern Radar", Artech House, 3rd Edition, 2010.

Supplementary Readings

1. C M. I. Richards, "Fundamentals of Radar Signal Processing", McGraw-Hill, 2nd Edition, 2005.
2. D.K. Barton, H. R. Ward, "Handbook of Radar Measurement", Artech House, 1st Edition, 1984.