Radar Systems	COE312
Prerequisite: COE303	(3-2-0-2)

Introduction to Radar: Signal-to-Noise Ratio, Detection, Measurements, functions, Applications. Radar Equation: Received Power, Receiver Thermal Noise, Radar Range Equation, Multiple Pulses, Losses, Link Equation. Radar Search and Detection, Propagation Effects. Doppler Phenomenology and Data Acquisition: Doppler Shift, Multiple Pulses, Range-Doppler Spectrum. Antennas and Transmitters. Receivers and Exciters: Receiver Types and Functions, Demodulation, Noise Power and Dynamic Range, Exciter Design, and Components, Timing and Control Circuits. Radar Processor Structure, Implementation Technology. Detection Strategies, Optimal Detection, Statistical Models for Noise and Target RCS, Threshold Detection. Doppler Processing: Doppler Shift and Pulsed Radar Data, Data Acquisition and Characteristics, Moving Target Indication, Pulse-Doppler Processing, Clutter Mapping and MTI. Radar Measurements: Precision and Accuracy, Signal Model, Parameter Estimation, Range Measurements, Phase Measurements, Doppler and Range Rate Measurements, RCS and Angle Measurements, Coordinate Systems. Radar Tracking: Motion Models, Measurement Models, Track Filtering.

Practical part: Radar system settings. Doppler radar concept, speed calculation, time bomb detection, time period calculation, intrusion alarm and door actuators, event counting, plasma movement, transformer hum and frequency, target and radar jamming, vehicle ground speed, size, and distance detections, pedestrian presence detection and traffic.