

MODULE-I: Introduction and Cooperative Vehicular Safety Applications:(6 Hours)
Basic Principles and Challenges, Past and Ongoing VANET Activities, Enabling Technologies, Cooperative System Architecture, VANET-enabled Active Safety Applications.

MODULE-II: Vehicular Mobility Modeling for VANET: (10 Hours)
Random Models, Flow Models – Microscopic flow models, Macroscopic flow models, Mesoscopic flow models, Lane changing models; Traffic Models – Trip planning, Path planning, Influence of time; Behavioral Models, Trace or Survey-based Models.

MODULE-III: Physical Layer & MAC Layer Considerations for Vehicular Communications: (11Hours)
Wireless Propagation Theory – Deterministic multipath models, Statistical multipath models, Path loss modelling; Channel Metrics – Delay spread, Coherence bandwidth, Doppler spread, Coherence time, Impact on OFDM systems; A Survey on Proposed MAC Approaches for VANETs - Time-division, Space-division, Code-division; Communication based on IEEE 802.11p.

MODULE-IV: Routing Protocols: (8 Hours)
Ad-hoc routing - Proactive routing protocols, Reactive routing protocols; Geographic routing - Geographic routing, Virtual-coordinate-based routing; Geocasting - ETSI GeoNetworking, Decentralized environmental notification messages, Topology-assisted geo-opportunistic routing.

MODULE-V: Standards and Regulations:(7 Hours)
Layered Architecture for VANETs - General concepts and definitions, A protocol stack for DSRC; DSRC Regulations, DSRC Physical Layer Standard, DSRC Data Link Layer Standard (MAC and LLC).

TEXTBOOKS

1. H. Hartenstein and K. P. Laberteaux, VANET: Vehicular Applications and Inter-Networking Technologies, Wiley, 2010.
2. ChirstophSommer, Falko Dressler, Vehicular Networking, Cambridge University Press, 2015.

REFERENCE BOOKS:

1. H. Moustafa, Y. Zhang, Vehicular Networks: Techniques, Standards, and Applications, CRC Press, 2009.
2. Claudia Campolo, AntonellaMolinaro and Riccardo Scopigno, Vehicular ad hoc Networks: Standards, Solutions, and Research, Springer, 2015.