



AMITY UNIVERSITY
— UTTAR PRADESH —

Course Title: Ad Hoc & Wireless Sensor Network

Course Level: Post Graduate

Course Code: CSE-622

Credit Units: 04

L	T	P/ S	SW/F W	TOTAL CREDIT UNITS
3	1	-	-	04

Course Objectives:

This course covers major aspects of ad hoc and sensor networking, from design through performance issues to application requirements. It starts with the design issues and challenges associated with implementations of ad hoc and sensor network applications. This includes mobility, disconnections, and battery power consumption. The course provides a detailed treatment of proactive, reactive, and hybrid routing protocols in mobile wireless networks. It also covers the IEEE 802.11 Wireless LAN and Bluetooth standards and discusses their characteristics and operations. About half of the course time is spent on wireless sensor networks (architecture, design, protocols, and applications). Through a project, the course gives students hands-on experience in designing a mobile ad hoc network using the NS2 network simulator.

Pre-requisites: Computer networking, algorithms and algorithm analysis, and Basic knowledge in programming.

Student Learning Outcomes:

1. Student has an understanding of the principles of mobile ad hoc networks (MANETs) and what distinguishes them from infrastructure-based networks.
2. Student have an understanding of the principles and characteristics of wireless sensor networks (WSNs).
3. Student understand how proactive protocols function and their implications on data transmission delay and bandwidth consumption.
4. Student understands how reactive routing protocols function and their implications on data transmission delay and bandwidth consumption.
5. Student understands how proactive routing protocols function and their implications on data transmission delay and bandwidth consumption.
6. Student understand how reactive routing protocols function and their implications on data transmission delay and bandwidth consumption.
7. Student are familiar with the mechanisms for implementing security and trust mechanisms in MANETs and WSNs.
8. Student have acquired skills to design and implement a basic mobile ad hoc or wireless sensor network via simulations or programming of PDAs.

Course Contents/Syllabus:

	Weightage (%)
Module I : Introduction	
Mobile Ad-Hoc Networking with a View of 4G Wireless: Imperatives and Challenges, Off-the-Shelf Enables of Ad Hoc Networks, IEEE 802.11 in Ad Hoc Networks: Protocols, Performance and Open Issues, Scatternet Formation in Bluetooth Networks, Antenna Beamforming and Power Control for Ad Hoc Networks.	10%

Module II: Topology in Wireless Ad Hoc Network	
Topology Control in Wireless Ad Hoc Networks, Broadcasting and Activity Scheduling in Ad Hoc Networks, Location Discovery, Mobile Ad Hoc Networks (MANETs): Routing Technology for Dynamic, Wireless Networking, Routing Approaches in Mobile Ad Hoc Networks.	15%
Module III : Security in Ad Hoc Network	
Energy-Efficient Communication in Ad Hoc Wireless Networks, Ad Hoc Networks Security, Self-Organized and Cooperative Ad Hoc Networking, Simulation and Modeling of Wireless, Mobile, and Ad Hoc Networks, Modeling Cross-Layering Interaction Using Inverse Optimization, Algorithmic Challenges in Ad Hoc Networks.	20%
Module IV : Routing Protocols for Wireless Sensor Networks	
Introduction, Data Dissemination and Gathering, Routing Challenges and Design Issues in Wireless Sensor Networks Network Scale and Time-Varying Characteristics, Resource Constraints, Sensor Applications Data Models, Routing Strategies in Wireless Sensor Networks: WSN Routing Techniques, Flooding and Its Variants, Sensor Protocols for Information via Negotiation, Low-Energy Adaptive Clustering Hierarchy, Power-Efficient Gathering in Sensor Information Systems, Directed Diffusion, Geographical Routing.	25%
Module V: Medium Access Control Protocols for Wireless Sensor Networks	
Wireless Transmission Technology and Systems: Radio Technology Primer, Available Wireless Technologies. Medium Access Control Protocols for Wireless Sensor Networks: Fundamentals of MAC Protocols, MAC Protocols for WSNs, Sensor-MAC Case Study,	20%

IEEE 802.15.4 LR-WPANs Standard Case Study.	
Module VI : Operating Systems for Wireless Sensor Networks	10%
Introduction, Examples of Operating Systems: TinyOS, Mate, MagnetOS	

Pedagogy for Course Delivery:

The class will be taught using theory and case based method. In addition to assigning the case studies, the course instructor will spend considerable time in understanding the concept of innovation through the eyes of the consumer. The instructor will cover the ways to think innovatively liberally using thinking techniques.

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	End Term Examination
100%	-	100%

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	Attendance	Class Test	Assignment	Case Study	

Weightage (%)	5%	10%	7%	8%	70%

Text & References:

- **Ad Hoc Wireless Networks: Architectures and Protocols, Prentice Hall PTR, 2007.**
- **Protocols & Architectures for Wireless Sensor Networks, Wiley, 2005**

Any Other Material: NIL