	National Institute of Technology Meghalaya	CURRICULUM
	An Institute of National Importance	

Programme	**Bachelor of Technology in Computer Science and Engineering**		Academic Year of Regulation	**2018-19**
Department	**Computer Science and Engineering**		Semester	**VIII**

Course Code	Course Name		Credit Structure				Marks Distribution			
			L	T	P	C	INT	MID	END	Total
CS 416	**Wireless Sensor Network**		**3**	**0**	**0**	**3**	**50**	**50**	**100**	**200**

Course Objectives	To provide the students with some knowledge about WSN, application of WSN in real life.	Course Outcomes	CO1	Able to understand the fundamental concept of wireless sensor network and its applications and challenges.
	To develop the student's ability to understand the challenges of WSN implementation and possible solutions.		CO2	Able to explain various tasks and components of sensor nodes and the architecture of wireless sensor networks.
	To develop the student's ability to understand different communication protocols and their underlying design.		CO3	Able to identify the physical layer design of wireless sensor networks.
	To develop the student's ability to understand time synchronization algorithms and localization and positioning procedures.		CO4	Able to examine MAC protocols and concepts of Error control, Framing, Link management.
	To provide the students with some knowledge about the various topology-control algorithms and routing protocols.		CO5	Able to interpret various time synchronization protocols and different localization and positioning algorithms.
			CO6	Able to elaborate topology control mechanisms and routing protocols for wireless sensor networks and main design issues.

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
1	CO1	0	0	1	0	2	1	0	1	1	0	2	0	1	2	1
2	CO2	1	2	0	1	0	0	1	2	2	1	0	1	3	2	2
3	CO3	0	3	2	2	1	0	0	1	0	2	1	0	2	1	2
4	CO4	3	2	0	1	2	1	0	1	2	3	0	2	3	2	3
5	CO5	3	3	2	1	0	2	0	2	3	1	1	0	1	2	1
6	CO6	2	1	0	2	3	2	2	0	1	2	0	1	3	1	2

	SYLLABUS		
No.	Content	Hours	COs
I	**Introduction:** The vision of Ambient Intelligence, Application of WSN, Challenges for WSNs, Mobile ad hoc networks and wireless sensor networks, Fieldbuses and wireless sensor networks, Enabling technologies for wireless sensor networks;	1	CO1
II	**Single-node architecture:** Hardware components, Energy consumption of sensor nodes, Operating systems and execution environments, Examples of sensor nodes;	1	CO2
II	**Network architecture:** Sensor network scenarios, Optimization goals and figures of merit, Design principles for WSNs, Service interfaces of WSNs, Gateway concepts;	3	CO2
IV	**Physical layer:** Introduction, Wireless channel and communication fundamentals, Physical layer and transceiver design considerations in WSNs;	3	CO3
V	**MAC protocols:** Fundamentals of MAC protocols, Low duty cycle protocols and wakeup concepts, Contention-based protocols, Schedule-based protocols, The IEEE 802.15.4 MAC protocol, IEEE 802.11 and Bluetooth;	6	CO4
VI	**Link-layer protocols:** Error control, Framing, Link management;	3	CO4
VII	**Naming and addressing:** Fundamentals, Address and name management in wireless sensor networks, Assignment of MAC addresses, Distributed assignment of locally unique addresses, Content-based and geographic addressing;	3	CO5
VIII	**Time synchronization:** Introduction to the time synchronization problem, Protocols based on sender/receiver synchronization (LTS and TPSN), Protocols based on receiver/receiver synchronization (RBS and HRTS);	4	CO5
IX	**Localization and positioning:** Properties and approaches of localization and positioning procedures, Mathematical basics for the lateration problem, Single-hop localization, Positioning in multihop environments, Impact of anchor placement;	4	CO5
X	**Topology control:** Motivation and basic ideas, Controlling topology in flat networks – Power control, Hierarchical networks by dominating sets, Hierarchical networks by clustering, Combining hierarchical topologies and power control, Adaptive node activity;	4	CO6
XI	**Routing protocols:** Forwarding and routing, Gossiping and agent-based unicast forwarding, Energy-efficient unicast, Broadcast and multicast, Geographic routing, Mobile nodes	4	CO6
	Total Hours	36	

Essential Readings

1. Karl H, Willig A. Protocols and architectures for wireless sensor networks. John Wiley & Sons; 2007.

2. Dargie W, Poellabauer C. Fundamentals of wireless sensor networks: theory and practice. John Wiley & Sons; 2010.

3. Yang K. Wireless sensor networks. 2014.

Supplementary Readings

1. Khan S, Pathan AS, Alrajeh NA, editors. Wireless sensor networks: Current status and future trends. CRC press; 2016.

2. Güngör VÇ, Hancke GP, editors. Industrial wireless sensor networks: Applications, protocols, and standards. Crc Press; 2013.

3. Forster A. Introduction to wireless sensor networks. John Wiley & Sons; 2016.