

# ISLAMIC UNIVERSITY OF TECHNOLOGY

## Department of Computer Science and Engineering (CSE)

### Course Outline and Course Plan

Name of the Teacher	Ashrafal Alam Khan	Position	Assistant Professor
Department	CSE	Programme	B.Sc. Eng.
Course Code	CSE 4615	Course Title	Wireless Networks
Academic Year	2020-21	Semester	Summer
Contact Hours	2.0	Credit Hours	2.0
Textbooks and Reference books	1. Wireless Communications and Networks, 2 <sup>nd</sup> Edition 2. IEEE 802 Wireless Systems, 1 <sup>st</sup> Edition (Wiley) 3. Computer Networking: A Top-Down Approach, 6 <sup>th</sup> Edition	Authors of the books	1. William Stallings 2. B. H. Walke, S. Mangold and L. Berlemann 3. James F. Kurose and Keith W. Ross
Prerequisites (If any)	1. CSE 4405 Data and Telecommunications 2. CSE 4511 Computer Networks		
Course Homepage	<a href="https://classroom.google.com/c/NDI5OTIxODgwNDUy?cjc=abqincf">https://classroom.google.com/c/NDI5OTIxODgwNDUy?cjc=abqincf</a>		
Teaching Methods/ Approaches	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Project	<input checked="" type="checkbox"/> Group discussion <input type="checkbox"/> Others: Tutorial classes	<input type="checkbox"/> Demonstration <input checked="" type="checkbox"/> Problem solving
Teaching aids	<input checked="" type="checkbox"/> Multi-media OHP	<input checked="" type="checkbox"/> Board and Marker	Others

Course Assessment Method								
Attendance (10%)	Summation of best 3 Quizzes (Total 30%)				Extra Evaluation		Mid Semester (25%)	Semester Final (35%)
	1 <sup>st</sup> Quiz	2 <sup>nd</sup> Quiz	3 <sup>rd</sup> Quiz	4 <sup>th</sup> Quiz	Others		Week/Date	Week/Date
	Week/Date	Week/Date	Week/Date	Week/Date	Assignment	Homework		
	3 <sup>rd</sup> Week	6 <sup>th</sup> Week	10 <sup>th</sup> Week	13 <sup>th</sup> Week	May replace quizzes	Will be given time to time	As per schedule of IUT	As per schedule of IUT

Grading Policy					
Marks out of 100	Letter Grade	Grade Point	Marks out of 100	Letter Grade	Grade Point
80 - 100	A+	4.00	55 - 59	B-	2.75
75 - 79	A	3.75	50 - 54	C+	2.50
70 - 74	A-	3.50	45 - 49	C	2.25
65 - 69	B+	3.25	40 - 44	D	2.00
60 - 64	B	3.00	00 - 39	F	0.00

Course Contents	
○	Introduction to wireless networks: wireless access networks, personal area networks (wireless sensor networks, body area networks, LoWPAN, and Bluetooth), wireless and mobile ad hoc networks, challenged networks (DTNs, VANETs).
○	Wireless MAC protocols: IEEE 802.11, IEEE 802.11e, IEEE 802.11n, IEEE 802.11s, IEEE 802.15.4, SMAC, B-MAC, IEEE 802.22/20, IEEE 802.16d/e
○	Wireless routing metrics – ETX, ETT, WCETT, Airtime Metric, routing protocols – AODV, DSR, DSDV, HWMP, sensor network routing, VANET routing, etc.
○	Wireless Transport protocols: Wireless TCP and its variants, Hop by Hop Congestion Control, Rate based Congestion Control, etc. Quality of Service in Wireless Networks.

Course Objectives
The course objectives of the course Wireless Networks are:
1) To study the evolving wireless technologies and standards
2) To understand the architectures of various access technologies
3) To understand various protocols and services provided by next generation networks
4) To learn how the protocols and services perform in practical scenarios

Mapping with CO, PO, and Bloom's Taxonomy			
CO No.	Course Outcomes (CO) Statement	levels of Bloom's Taxonomy	Matching with Program Outcome (PO)
CO1	Identify the working principle, architecture, and protocol of a wireless network through visual observation.	C4	PO2
CO2	Measure the efficiency of a wireless network in terms of overall network throughput, quality of service, energy consumption, and other network parameters used to evaluate a network.	C1	PO1
CO3	Apply the knowledge of learned protocols and architectures to improve existing wireless technologies in terms of network performance metrics.	C3	PO1, PO2, PO3
CO4	Formulate appropriate network environments (architecture, protocols, etc.) for novel and challenging network scenarios by analyzing pre-existing wireless networks.	C6	PO1, PO3, PO4

Weekly plan for course content and mapping with CO		
Weeks	Topics	COs
1	Introduction: An overview of Wireless Networks Internet and Access Networks	CO1, CO3, CO4
2	IEEE 802.15 Personal Area Networks (PAN) Body Area Networks, LoWPAN, Bluetooth	
3	Wireless Sensor Networks (WSN) Wireless and Mobile Ad Hoc Networks (MANET)	
4	Challenged Networks (DTN, VANET) Software Defined-Networks (SDNs)	
5	Wireless MAC Protocols: IEEE 802.11 and IEEE 802.11e	CO1, CO3
6	Wireless MAC Protocols: IEEE 802.11n, IEEE 802.11s and IEEE 802.15.4	
7	Wireless MAC Protocols: S-MAC, B-MAC, RI-MAC, and LEACH	
	<b>MID TERM EXAMINATION</b>	

8	Wireless MAC Protocols: IEEE 802.22/20, IEEE 802.16d/e	CO1, CO3
9	Wireless Routing Metrics: ETX, ETT, WCETT, Airtime Metric	CO2, CO3, CO4
10	Routing Protocols: AODV, DSR, DSDV, HWMP	
11	Sensor Network Routing, VANET Routing Wireless TCP and Variants	
12	Hop by Hop Congestion Control Rate based Congestion Control	CO2, CO4
13	Quality of Service (QoS)	
14	Emerging Technologies	CO3, CO4
	<b>SEMESTER FINAL EXAMINATION</b>	

Program Outcomes		
PO 1	<b>Engineering Knowledge:</b> Apply knowledge of <b>mathematics, natural science, engineering</b> fundamentals and system fundamentals, software development, networking & communication, and information assurance & security to the solution of complex engineering problems in computer science and engineering.	
PO 2	<b>Problem Analysis:</b> Ability to <b>identify, formulate</b> and <b>analyze complex</b> Computer Science and Engineering problems in the areas of hardware, software, theoretical Computer Science, and applications to reach significant conclusions by applying Mathematics, Natural sciences, Computer Science and Engineering principles.	
PO 3	<b>Design/ Development of Solutions:</b> <b>Design solutions</b> for complex computer science and engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.	
PO 4	<b>Investigation:</b> Ability to use <b>research-based knowledge</b> and <b>research methods</b> to perform literature survey, design experiments for complex problems in designing, developing and maintaining a computing system, collect data from the experimental outcome, analyze and interpret valid/interesting patterns and conclusions from the data points.	
PO 5	<b>Modern Tool Usage:</b> Ability to create, select and apply <b>state of the art tools</b> and techniques in designing, developing, and testing a computing system or its component.	
PO 6	<b>The Engineer and Society:</b> Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to <b>professional engineering practice</b> in system development and solutions to <b>complex engineering problems</b> related to system fundamentals, software development, networking & communication, and information assurance & security.	
PO 7	<b>Environment and Sustainability:</b> Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to <b>professional engineering practice</b> in system development and solutions to <b>complex engineering problems</b> related to system fundamentals, software development, networking & communication, and information assurance & security.	
PO 8	<b>Ethics:</b> Apply <b>ethical principles</b> and commit to <b>professional ethics</b> and <b>responsibilities</b> and norms of computer science and engineering practice.	
PO 9	<b>Individual Work and Teamwork:</b> Ability to function as an individual and as a team player or leader in multidisciplinary teams and strive towards <b>achieving a common goal</b> .	

	Recognize the need for and have the preparation and ability to <b>engage in independent</b> and <b>lifelong learning</b> in the broadest context of technological change.
<b>PO 10</b>	<b>Communication:</b> <b>Communicate effectively</b> on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
<b>PO 11</b>	<b>Project Management and Finance:</b> Demonstrate knowledge and understanding of engineering management principles and economic decision making and apply these to one's own work, as a member and leader in a team, to <b>manage projects</b> and in multidisciplinary environments.
<b>PO 12</b>	<b>Life-long learning:</b>

Mapping of COs and POs [Correlation level 1 for low, 2 for moderate and 3 for high]												
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>		3										
<b>CO2</b>	3											
<b>CO3</b>	3	2	2									
<b>CO4</b>	3		3	3								

**Student's consulting hour:** Tuesday at 2:00 PM

### **Instructor contact details:**

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