

## COURSE DESCRIPTION FORM

INSTITUTION FAST-NUCES

PROGRAM (S) TO BE EVALUATED Computer Science

### A. Course Description

Course Code	CS 3001
Course Title	Computer Networks
Credit Hours	3 + 1
Prerequisites by Course(s) and Topics	CS2001-Data Structures
Assessment Instruments with Weights (homework, quizzes, midterms, final, programming assignments, lab work, etc.)	<p>Quiz (2): 6%</p> <p>Assignments (2): 6%</p> <p>Project (1): 8% (Proposal, Demo Presentation, Report)</p> <p>Mid-1: 15%</p> <p>Mid-2: 15%</p> <p>End-term (Final): 50%</p>
Course Coordinator	Dr-Ing. Farrukh Salim Shaikh ( <a href="mailto:farrukh.salim@nu.edu.pk">farrukh.salim@nu.edu.pk</a> )
Class Teacher	Dr-Ing. Farrukh Salim Shaikh ( <a href="mailto:farrukh.salim@nu.edu.pk">farrukh.salim@nu.edu.pk</a> )
URL (if any)	<p>Google Classrooms:</p> <p>1) <a href="https://classroom.google.com/c/Nzc0MTk3OTEzMDkx">https://classroom.google.com/c/Nzc0MTk3OTEzMDkx</a> (BCS-5A)</p> <p>2) <a href="https://classroom.google.com/c/Nzc0MTk3OTIxMDg3">https://classroom.google.com/c/Nzc0MTk3OTIxMDg3</a> (BCS-5K)</p>
Current Catalog Description	<p>The learning and skill-based objectives of this course resolve around the following questions:</p> <ul style="list-style-type: none"> <li>How does the global network infrastructure work and what are the design principles on which it is based?</li> <li>In what ways are these design principles compromised in practice?</li> <li>How should Internet applications be written, so they can obtain the best possible performance both for themselves and for others using the infrastructure?</li> <li>How do we ensure that it will work well in the future in the face of rapidly growing scale and heterogeneity?</li> </ul> <p>The course will focus on the design &amp; undergraduate level analysis of large-scale networked systems and tool (Wireshark, packet tracer) based implementation and evaluation of small-scale networked systems in the Lab.</p>
Textbook (or Laboratory Manual for Laboratory Courses)	<p>J. F. Kurose and K. W. Ross --- <b>Computer Networking: A Top-Down Approach, 9th Edition</b></p> <p>Wireshark, Packet Tracer, and GNS3 Labs (mostly by the lab instructors)</p>
Reference	A. S. Tannenbaum and D. J. Wetherall --- <b>Computer Networks, 6<sup>th</sup> Edition</b>

Material	B. A. Forouzan --- <b>Data Communications &amp; Networking with TCP/IP Protocol Suite, 6<sup>th</sup> Edition</b> W. Stallings --- <b>Data and Computer Communications, 10th Edition</b>																																																																																																															
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						✓						
			4			✓						
<b>Topics Covered in the Course, with Number of Lectures on Each Topic</b> (assume 15-week instruction and one-hour lectures)	Week	Duration	Topics Covered									CLOs
	1.	L1 = 1 hour L2 = 1 hour L3 = 1 hour	1.1 - Introduction, Course 1.2 - Network Edge, 1.3 - Network Core (Tiers of ISPs, Backbones)									1
	2.	L1 = 1 hour L2 = 1 hour  L3 = 1 hour	1.4 - Delay, Loss and Throughput 1.5 - Protocol Layers, Service Model, 1.6 - Network Under Attacks 2.1 - Principles of network Applications 2.2 - Web and HTTP									1
	3.	L1 = 1 hour L2 = 1 hour L3 = 1 hour	2.2 - Web and HTTP 2.3 - Electronic Mail` 2.4 - DNS—The Internet’s Directory Service <b>(Assignment 1 will be assigned in the 3rd week)</b>									1,2
	4.	L1 = 1 hour L2 = 1 hour  <b>1 Hour</b>	2.4 - DNS—The Internet’s Directory Service 3.1 - Transport Layer service 3.2 - Multiplexing and De-multiplexing <b>Quiz 1</b>									1,2,3
	5.	L1 = 1 hour L2-L3 = 2 hours	3.3 - Connectionless Transport UDP 3.4 - Principles of Reliable data transport									1,2,3
	6.	<b>1 Hour</b> L1 = 1 hour	<b>Midterm # 1</b> 3.4 – Principles of Reliable data transport <b>(Assignment 2 will be assigned in the 6th week)</b>									1,2
	7.	L1 = 1 hour  L2 = 1 hour  L3 = 1 hour	3.5 - Connection Oriented Transport: TCP 3.5.2 TCP Segment Structure 3.5.3 Round-Trip Time Estimation and Timeout 3.5.4 Reliable Data Transfer 3.5.5 Flow Control 3.5.6 TCP Connection Management <b>(Project will be announced on the 7th week)</b>									1,2
	8.	L1-L2 = 2 hours <b>1 Hour</b>	3.7 - TCP Congestion Control <b>Quiz 2, Exam Review</b>									1,3

	9.	L1 = 1 hour	4.1 - Network Layer- Data Plane Introduction	1,2
		L2 = 1 hour	4.2.1 - Destination-Based Forwarding	
		L3 = 1 hour	4.3.1 - Internet Protocol (IPv4 Datagram Format)	
	10.	L1 = 1 hour	4.3.2 - IPv4 Addressing	1,2,3
		L2 = 1 hour	Class C Subnetting	
			Variable Length Subnet Mask (VLSM)	
		L3: 1 hour	4.3.3 - Network Address Translation (NAT)	
			4.3.4 - IPv6	
			4.4 - Generalized Forwarding and SDN	
	11.	1 Hour	Midterm # 2	1,2
		L1 = 1 hour	5.1 - Network Layer-Control Plane Overview	
			5.2 - Routing Algorithms (Link State)	
	12.	L1-L2 = 2 hours	5.2 - Routing Algorithms (Distance Vector)	1,2,3
		L3 = 1 hour	5.3 - Intra-AS routing in the Internet: OSPF	
	13.	L1-L2 = 2 hours	5.4 - Routing Among the ISPs: BGP	1,2,3
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		5.5 The SDN Control Plane		
		Quiz 3, Exam Review		
	14.	L1 = 1 hour	6.1 - Introduction to Link layer	1,2
			6.2 - Error-Detection & Correction Techniques	
		L2-L3 = 2 hours	6.3 – Multiple Access Links and Protocols	
	15.	L1-L2 = 2 hours	6.4 Switched Local Area Networks	1,2
		L3 = 1 hour	6.6 - Data Center Networking	
	16.	3 hours	Course wrap-up	1,2,3
Laboratory Projects/Experiments Done in the Course	Project is focused on the application of network fundamentals and practices to develop efficient networking solutions and applications.			
Programming Assignments Done in the Course	Socket Programming			
Class Time Spent on (in credit hours)	Theory	Problem Analysis	Solution Design	Social and Ethical Issues
	40%	30%	30%	0%
Oral and Written Communications				

- No ReQuizz and Late Assignment submission
- Usage of generative artificial intelligence (AI) such as ChatGPT or Microsoft Copilot for producing assessment submissions etc. should be mentioned clearly with reference.



Instructor Name: Farrukh Salim Shaikh

Instructor Signature: \_\_\_\_\_

Date: August 18, 2025

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