Department of Computer Science & Engineering
NITK - Surathkal

Course Plan

Name of the Course: Computer Networks	**Course No:** CS301	**No. of Credits (L-T-P):** 3-1-0 (4)
Year & Semester, Section: 3rd year, V Semester, S1 & S2	**Course Type:** Programme Core (PC)	**Academic Session:** July - December, 2021

Prerequisites (if any)
None

Name and Contact Details of Course Instructor
Saumya Hegde
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Course Objectives

1. Provide a historical background and introduce the fundamental concepts of Computer Networks, while studying the layered architecture, using a top down approach.
2. Illustrate the roles and responsibilities of every layer in the protocol suite.
3. Explain the design principles, evolution and working of core network protocols of the Application, Transport, Network and Link layers.
4. Introduce the emerging networking trends like HTTP/2, Software Defined Networks and Network Automation.

Course (Learning) Outcomes (COs)

CO1: Understand the fundamental aspects of Computer Networking and also compare and contrast the various networking approaches.
CO2: Value and Critique the design philosophy of the internet and how it stood the test of time.
CO3: Identify the roles and responsibilities of the layers in the network stack and deduce the reasons for this.
CO4: Analyze the working of core network protocols, and use them to either build new network applications or optimize the performance of existing ones.
CO5: Ability to analyze, design and engineer networking protocols by learning from the past design philosophies and taking into account the future trends.

Teaching Learning Interaction

No	Topics	Reference	Online Sessions
1	Computer Network and Internet - Network Edge and Core, Access Networks, Protocol Layers, History of Networking and Internet. Socket Programming	Chapter 1 [Kurose and Ross 2017] Chapter 1 [Fall and Richard 2011] Networking History [Clark 1988] and [Cerf 2009] Socket Programming Chapter 2 [Kurose and Ross 2017]	5
2	Application Layer - Principles of Network Application. The Web and HTTP, HTTP/2, FTP, TFTP, DNS	Chapter 2 [Kurose and Ross 2017] Chapter 2 [Forouzan and Fegan 2017] HTTP/x [Grigorik 2013]	15
3	Transport Layer - UDP, UDP Lite. TCP - Connection Management, Timeout and Retransmission, Data Flow, Congestion Control, Timers .	Chapter 10, 12 - 17 [Fall and Richard 2011]	15
4.	Network Layer - Data Plane - Inside a Router, NAT, SDN Forwarding. Control Plane - Routing Algorithms, SDN Control Plane, Network Management	Chapter 4, 5 [Kurose and Ross 2021]	10
5.	Link Layer - ARP Data Center Networking - Architecture and Trends A Day in the Life of a Web Page Request	Chapter 6 [Kurose and Ross 2021]	5
Gaps in the Syllabus (if any)		none	
Topics beyond syllabus/Advanced Topics (if any)		none	

Evaluation Scheme:
Quizzes - 10%
Assignment - 20%
Mid Sem - 25%
End Sem - 45%

Assignment Details:
The students will read and understand a paper, published in the area of Computer Network. They will then record a short video, where they will discuss the paper using slides.

Team:	2 members.
Presentation duration:	10 minutes
Important dates:	Finalyse topics: **27 September 21** (CR's may send a consolidated list with name, reg. no. and title of presentation.)
	Submit recorded video: **1 November 21**
Mark distribution:	Depth of content covered - 5
	Understanding - 8
	Verbal delivery - 4
	Organization of content on slides - 3

List of Text Books & Reference Books, Publications:

[Kurose and Ross 2017] James F Kurose and Keith W. Ross *Computer Networking: A top-down Approach featuring the Internet, 6/E*. Pearson Education India, 2017.

[Fall and Richard 2011] Kevin R. Fall and Richard W. Stevens *TCP/IP illustrated, Volume 1: The protocols. 2/E,* Addison-Wesley, 2011.

[Forouzan and Fegan 2017] B. A. Forouzan and F Mosharraf *Computer Networks: A Top-down approach*, McGraw-Hill Higher Education, 2017.

[Grigorik 2013] Ilya Grigorik *High Performance Browser Networking: What every Web Developer should know about Networking and Web Performance*. " O'Reilly Media, Inc.", 2013.

[Clark 1988] D. D. Clark *The Design Philosophy of the DARPA Internet Protocols* ACM SIGCOMM Communications Review, August 1988

[Cerf 2009] Barry M. Leiner, Vinton G. Serf, D. D. Clark et. al. *A Brief History of the Internet* ACM SIGCOMM Computer Communications Review, October 2009

[Kurose and Ross 2021] James F Kurose and Keith W. Ross *Computer Networking: A top-down Approach featuring the Internet, 8/E*. Pearson Education India, 2021.