

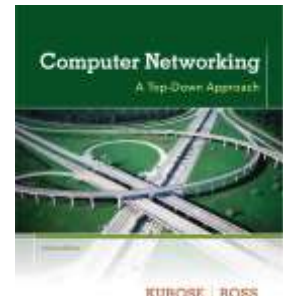


**Birla Institute of Technology & Science, Pilani**  
**Hyderabad Campus, Hyderabad**  
 Department of Computer Science and Information Systems  
 Second Semester 2018-2019 Course Handout (Part II)

**Date:** 8<sup>th</sup> Jan 2018

In addition to Part-I (General handout for all courses appended to the timetable) this portion gives further specific details regarding the course:

COURSE NO. : **CS F303**  
 Room No : F106 (T, Th, S: 3<sup>rd</sup> hour)  
 Credits : L P U (3 1 4)



**Computer Networks**

**Instructors:** Chittaranjan Hota (I/C), Sudeepta Mishra, Rajiv Ranjan Maiti

**Scope:**

This course will give you a breakdown of the applications, communications protocols, and network services that make a computer network work. We will closely follow the top down approach to computer networking, which will enable you to first understand the most visible part i.e. the applications, and then seeing, progressively, how each layer is supported by the next layer down. Most of the time our example network will be the Internet. Also, a chapter on wireless and mobile networks will be covered as currently users access the Internet from offices, from homes, while on move, and from public places wirelessly. Overview of Security threats on Computer networks will also be covered.

**Objectives:**

- To learn design choices and implementation aspects of various protocol layers in an example network stack like the Internet.
- To be able to design your own network using some of the openly available stacks.
- To perform several programming assignments using wireshark, a network protocol analyzer tool and Ns3, a network simulator.

**TEXT BOOK**

[T1] James F. Kurose and Keith W. Ross: Computer Networking: A Top-Down Approach, Sixth Edition, 2013, Pearson.

**REFERENCE BOOKS**

- [R1] Andrew S. Tanenbaum, Computer Networks, Fourth Edition, Pearson Education, 2006.  
 [R2] B A Forouzan, and F Mosharraf, Computer Networks: A Top Down Approach, TMH, SiE, 2012.  
 [R3] L. Peterson and B. Davie, Computer Networks: A Systems Approach, Fourth Edition, MK, 2007.

**PLAN OF STUDY:**

Sl. No.	Learning Objectives	Topic	Chapter Ref.	Lect.s
1.	Usage of Computer networks and its hardware structure.	Introduction: Uses of Computer Networks, Network Hardware: The Network Edge, The Network Core, Access Networks.	T1(1)	2
2.	Internet architecture and performance bottlenecks and Software architecture.	ISPs and Internet Backbones, Delay and Loss in Packet Switched Networks, Network Software: Protocol Hierarchies, and their Service Models.	T1(1)	2
3.	Example protocol stacks.	Reference Models (OSI, TCP/IP)	T1 (1)	1
4.	World wide web and its' application layer protocol.	Application Layer: Hypertext Transfer Protocol, HTTP Message Format, Cookies, Conditional GET.	T1 (2)	2
5.	E-Mail application and domain name systems.	Simple Mail Transfer Protocol, Domain Name Systems (DNS).	T1 (2)	2

6.	Socket API for building applications.	Socket Programming with TCP and with UDP.	T1 (2)	2
7.	Transport layer fundamentals: Reliable and Un-reliable principles.	Transport Layer: Multiplexing, Demultiplexing, UDP, Principles of Reliable Data Transfer (Go-Back-N, and Selective Repeat).	T1 (3), R1 (6)	2
8.	Flow control mechanism and Round trip time estimation.	TCP: Segment structure, RTT Estimation and Timeout, TCP Flow Control.	T1 (3), R1 (6), R3 (5)	2
9.	Understanding the principles behind reliable packet delivery.	TCP Error Control and Congestion Control.	T1 (3), R3 (6)	2
10.	Learning various types of services at network layer.	Network Layer: Virtual Circuits and Datagram Networks, what is Inside a Router? Forwarding and Addressing in the Internet.	T1 (4), R1 (5)	2
11.	Learning different approaches to find out paths within a subnet.	Routing Algorithms: Shortest Path, Flooding, Link State, Distance Vector, and Hierarchical Routing.	T1 (4), R1 (5)	3
12.	Example routing in real Internet.	Routing in the Internet: RIP, OSPF, Border Gateway Protocol, and Multicasting.	T1 (4), R1 (5)	3
13.	Features of data link layer and its' importance in a network stack.	Data Link Layer: Services, Error Detection and Correction Techniques (Parity Checks, Checksums, CRC).	T1 (5), R1 (3)	2
14.	Various protocols at MAC layer to control access to the broadcast medium.	Multiple Access Protocol: Slotted ALOHA, ALOHA, CSMA, Local Area Networks.	T1 (5), R1 (4)	3
15.	Credentials and popular MAC layer protocol.	Link Layer Addressing: MAC Addresses, ARP, DHCP; Ethernet: Frame Structure, CSMA/CD.	T1 (5), R1 (4)	2
16.	Devices at data link layer.	Interconnections: Hubs, and Switches.	T1 (5), R3(3)	1
17.	Connection oriented service over a Network layer stack.	Link Virtualization: Multiprotocol Label Switching (MPLS).	T1 (5)	2
18.	Characteristics of Wireless network, cellular architecture and their protocols.	Wireless Networks: Wireless Links and Network Characteristics, Wi-Fi: 802.11 Wireless LAN Architecture and Protocol, Cellular Internet access.	T1 (6)	2
19.	IP mobility for supporting mobile users.	Mobile Networks: Mobility management, Mobile IP.	T1 (6)	1
20.	Physical layer characteristics and link types. Inherent characteristics of these links.	Physical Media: The theoretical basis for data communication (Fourier Analysis, Bandwidth Limited Signals, Maximum Data Rate of a Channel), Guided physical media.	R1 (2), R3 (1)	2
21.	Security concerns in Computer networks and overview of some solutions.	Network Security: Overview of Cryptography, Key Exchange, Authentication, and Perimeter Security.	T1(8)	2

#### EVALUATION SCHEME:

Sl. No.	Component & Nature	Duration	Weightage	Date and Time
1.	Continuous lab evaluation with one Lab exam (20 + 30 marks)	1.0 hr.(exm)	25%	Will be announced in the class (exam during 2 <sup>nd</sup> wk. of April)
2.	Quizzes-2 (no makeup) Open book: Class/tutorial notes only.	30 mins.	15%	Will be announced in the class (2 <sup>nd</sup> week of Feb, 3 <sup>rd</sup> week of April)
3.	Mid-Sem Exam (Closed Book)	1.5 hrs.	25%	13/03/2019 (9.00 am)
4.	Compre. Exam (Open:15%, Close:20%)	3 hrs	35%	06/05/2019 (FN)

**Note:** All course notices will be displayed on the CSIS Notice Board and or CMS. **Chamber Consultation Hour:** Will be announced in the class. **Instructor-In-Charge**