



**Birla Institute of Technology & Science, Pilani**  
Hyderabad Campus

## SECOND SEMESTER 2019-2020

### Course Handout Part II

Date: 06-01-2020

In addition to part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

*Course No.* : CS F303  
*Course Title* : **Computer Networks**  
*Instructors* : Dipanjan Chakraborty (IC), Suvadip Batabyal, Manik Gupta, D V N Siva Kumar

### **Scope and Objective of the Course:**

- 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.
- A chapter on wireless and mobile networks will be covered as currently users access the Internet from offices, from homes, while on the move, and from public places using wireless media.
- We will also cover Multimedia Networking towards the end of the course.

### **Textbooks:**

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

### **Reference books**

1. [R1] Andrew S. Tanenbaum, Computer Networks, Fourth Edition, Pearson Education, 2006.
2. [R2] B A Forouzan, and F Mosharraf, Computer Networks: A Top Down Approach, TMH, SiE, 2012.
3. [R3] L. Peterson and B. Davie, Computer Networks: A Systems Approach, Fourth Edition, MK, 2007.
4. [R4] James F. Kurose and Keith W. Ross: Computer Networking: A Top-Down Approach, Seventh Edition, 2017, Pearson.
5. [R5] Behrouz A. Forouzan: Data Communications and Networking, 5<sup>th</sup> edition, 2013



## Course Plan:

Sl. No.	Learning Objectives	Topic	Chapters	Lectures
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.	Multimedia Networking	Applications, audio, video, VoIP, network support for multimedia	T1(7)	2

### Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Comprehensive examination	3 hours	35%	09/05 AN	Written, closed book
Mid-term examination	1.5 hours	25%	5/3 9.00 - 10.30AM	Written, closed book
Programming Assignments	Rolling	20%	TBA	Take home and in-lab, open material
In-lab evaluations	Each lab session	5%	-	-
In-class Assignments	Rolling, can happen in the lectures or tutorials	15%	unannounced	In-class, open material

**Chamber Consultation Hour:** TBA

**Notices:** To be circulated through CMS

### Evaluation and Make-up Policy:

- **Programming Assignments.** will be divided into sub-parts which the students should do over a week. In each lab session, the instructors will evaluate the sub-part for the preceding week. In the last week for an assignment, the student(s) will show the entire assignment end to end. All assignments are compulsory. If a student is late to submit a penalty of 10% per day will apply.
- **In-class Assignments.** All unattempted in-class assignments will be counted with a zero score. Ceiling of top 70% scores for in-class assignments (including unattempted in-class assignments) will be counted. For example, if a student scores the following in 10 in-class assignments: [UA, 10, 4, 7, UA, UA, 9, 0, 8, UA], the scores which will be counted are: [UA, UA, UA, UA, 10, 9, 8].
- Make up for **mid-term and comprehensive examinations** will be allowed only in extreme situations and institute rules will apply. However, *prior permission* from the IC is compulsory.

### NC Policy

Only writing the mid semester and comprehensive examination is not sufficient to clear this course. If an honest attempt is not made to learn in the course by attempting the assignments and the other components, an NC grade will summarily be awarded.

**Academic Honesty and Integrity Policy:** Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.



**INSTRUCTOR-IN-CHARGE**

