Birla Institute of Technology & Science, Pilani
Hyderabad Campus

Academic – Undergraduate Studies Division
SECOND SEMESTER 2024-2025
Course Handout Part II

Date: 26.12.2024

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**
Instructor in Charge : Nikumani Choudhury (nikumani@hyderabad.bits-pilani.ac.in)
Instructors. :Paresh Saxena, Dipanjan Chakraborty and G Geethakumari.

Scope of the Course: This is a fundamental computer networking course focusing on the relevant and state-of-the-art networking protocols and architectures. The course will cover the problems of computer networks and the standard ways to approach and resolve these problems. The goals of the course are to build on basic networking course material in providing a deep understanding of existing technology with concrete experience of the challenges through a series of lab exercises. The course aims to provide deep understanding of network architecture, protocols, and message structures at different layers of the protocol stack.

Objectives 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 follow a top-down approach to computer networking, which will enable you to learn the basics and then built upon them. This will also enable us to understand each layer and the services that a layer provides to the other layers.
- To gain hands-on experience with the networking protocols.
- Real-life examples with suitable demonstration through various tools in order to understand how network and internetwork operates.

Textbooks:

[T1] James F. Kurose and Ross, Computer networking: a top-down approach featuring the Internet, 7th Ed., Pearson, 2017.

Reference books

1. [R1] Behrouz A. Forouzan. Data Communications and Networking. McGraw Hill Pub., 5th edition, 2013.
2. [R2] Andrew S. Tanenbaum. Computer Networks. Fourth Edition, Pearson Education, 2006.
3. [R3] L. Peterson and B. Davie. Computer Networks: A Systems Approach. Fourth Edition, MK, 2007.
4. [R4] W. Richard Stevens, "TCP/IP Illustrated Volume 1, The protocol", 2nd Ed. Addison-Wesley,2011.
5.

Course Plan:

S.. No.	No. of Lectures	Learning objectives	Topics to be covered	Chapter in the Text Book
INTRODUCTION				
1	1	- To understand the course components and structure.	Basic introduction to the course, explanation of exams and evaluations, lab project, etc.	Class Notes
2	1	- To understand the basics of networks and protocol layers.	Basic introduction to protocol layers, some key performance metrics, and networks.	Class Notes
PART A: APPLICATION LAYER				
3	1	- To learn principles of network applications.	Network Application Architecture and Services	T1: Chapter 2, Class Notes
4	3	- To understand application layer protocols – their functioning and implementation in the protocol stack	Protocols including HTTP, SMTP, DNS and Peer-to-peer applications	T1: Chapter 2, Class Notes
PART A: TRANSPORT LAYER				
5	1	- To understand the basics of User Datagram Protocol (UDP)	UDP protocol, UDP segment structure, UDP checksum.	T1: Chapter 3, Class Notes
6	2	- To learn reliable data transfer protocols	Go-Back-N and Selective Repeat protocols	T1: Chapter 3, Class Notes
7	4	-To understand the basics of TCP and TCP variants	TCP connection, TCP segment structure, round trip time, understanding congestion, congestion control algorithms, TCP variants, Fairness	T1: Chapter 3, Class Notes
8	1	- To learn socket programming	UDP/TCP sockets and their usage	Class Notes
9	2	- To learn modern transport layer protocols	QUIC, Multipath TCP (MPTCP) and Multipath QUIC (MPQUIC)	Class Notes
PART B: NETWORK LAYER				
10	2	-To introduce network layer and network service models	CBR ATM network service, ABR ATM network service, routers, queueing.	T1: Chapter 4, Class Notes
11	4	- To understand the Internet Protocol (IP)	IP datagram, IPv4 addressing, NAT, IPv6, Quality of service in IP networks.	T1: Chapter 4, Class Notes
12	4	- To understand routing algorithms	Link-State (LS), Distance-Vector (DV), Hierarchical routing, RIP, OSPF, BGP,	T1: Chapter 4, Class Notes
PART C: LINK LAYER				
13	2	- To introduce link layer and error detection techniques.	Link layer services, error detection and correction techniques	T1: Chapter 5, Class Notes

14	2	- To learn link layer protocols	Channel partitioning protocols, random access protocols	T1: Chapter 5, Class Notes
15	2	- To understand local area networks	Link-layer addressing, ARP, Ethernet, Link layer switching, VLANs, MPLS	T1: Chapter 5, Class Notes
PART D: WIRELESS AND MOBILE NETWORKS				
16	5	- To understand wireless LAN architectures and protocols	Single-hop, Multi-hop infrastructures, IEEE 802.11 architecture and protocol, Bluetooth, IEEE 802.15.4, LoRaWAN	T1: Chapter 6, Class Notes
17	3	- To understand Cellular Internet Access	2G, 3G and 4G cellular data networks, Introduction to 5G: current status and future, 6G	Class Notes
	Total number of Lectures: 40			

Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Mid-term examination	90 min	30%	TBA	Closed book
Quiz 2 Nos. (best 1 out of 2 will be considered)	30 min	10%	TBA	Open book
Laboratory evaluation	120 min	20% (10% before mid-semester exam)	Continuous Evaluation	Open book
Comprehensive examination	180 min	40%	TBA	Closed book

The passing marks for the course will be 40% of the median marks.

Chamber Consultation Hour: TBA
Notices: To be displayed on CMS/Google Classroom.
Make-up Policy:
Make up will be allowed only in extreme situations and institute rules will apply. However, *prior permission* from the IC is compulsory.

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
CS F303